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PLANT INDUSTRY BRANCH

1990 ANNUAL REPORT

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Chapter 1

ADMINISTRATION AND ASSISTANCE PROGRAMS

1.1 OVERVIEW

This is the **FIRST** annual report of the new **PLANT INDUSTRY BRANCH** of the Nova Scotia Department of Agriculture and Marketing. The Plant Industry Branch resulted from the combining of the former Soils and Crops Branch and the Horticulture and Biology Branch. This union means that for the first time, clients of the province can get *one stop shopping* for agronomy, horticulture, weed science, biology, soil science and analytic services within the Department.

During the first year of operation of the new Branch, many new and important relationships have developed between members of the two former branches. As we discover ways of complementing each other the result will be even better service to the Agriculture Industry.

During 1990 the Branch was fortunate to complete major renovations to its facilities in Harlow Institute, Truro. The main office was enlarged and the front entry made more "user friendly" to clients coming in off the street.

The receiving area for the laboratory was also improved for easier sample receiving. The pesticide residue laboratory and the Soils Physics laboratory have been totally rebuilt — The first such renovation since the building in the early 1950's. Add to that a new computer system and you have what amounts to a totally new face and newly increased capacity for the Plant Industry Branch.

This annual report is a compilation of the happenings in various sections of the branch with some indications of the state of the Agriculture industry in Nova Scotia. There are also two more detailed technical reports that are available on the results of *Project Work* carried on by Branch members during the year. One is of projects in horticulture and the other deals in field crop topics. Copies can be obtained by contacting the Branch at its main offices in either Truro or Kentville.

It is hoped that the information contained within these reports find some use to those interested in the Agriculture Industry of Nova Scotia. We look forward to serving in 1991.

I would like to personally acknowledge and thank the many members of the Branch who worked so hard to make the transition to the combined Plant Industry go so smoothly and who made the production of this report possible.

J.B. Goit
Director

1.2 BRANCH ACTIVITIES

The Plant Industry Branch staff, Table 1.1, were active in a large number of meetings, committees, tours, publications, preparations and projects in 1989. A presentation of branch usage of vehicles during the year is found in Table 1.2.

1.3 ASSISTANCE POLICIES

1.3.1 Fertilizer Assistance Policy

The Fertilizer Assistance Policy was in full operation in 1990. A total of 1,739 applications were processed representing 1,632 individual claimants and $1,203,810.90 in assistance was paid out. Table 1.3 gives a summary of historic expenditures on the policy. The average claim size has been increasing annually but as the formula has been changed from a straight 25% to a maximum of $2500 to a sliding scale where the first $2000 of claim is paid 25%, the second $3000 is paid 20% and anything above that 10% to the maximum of $2500 assistance, claim size is decreased this year. Total program dollars are also reduced.

While most farmers made only one application some made more than one. Table 1.4 details this breakdown.

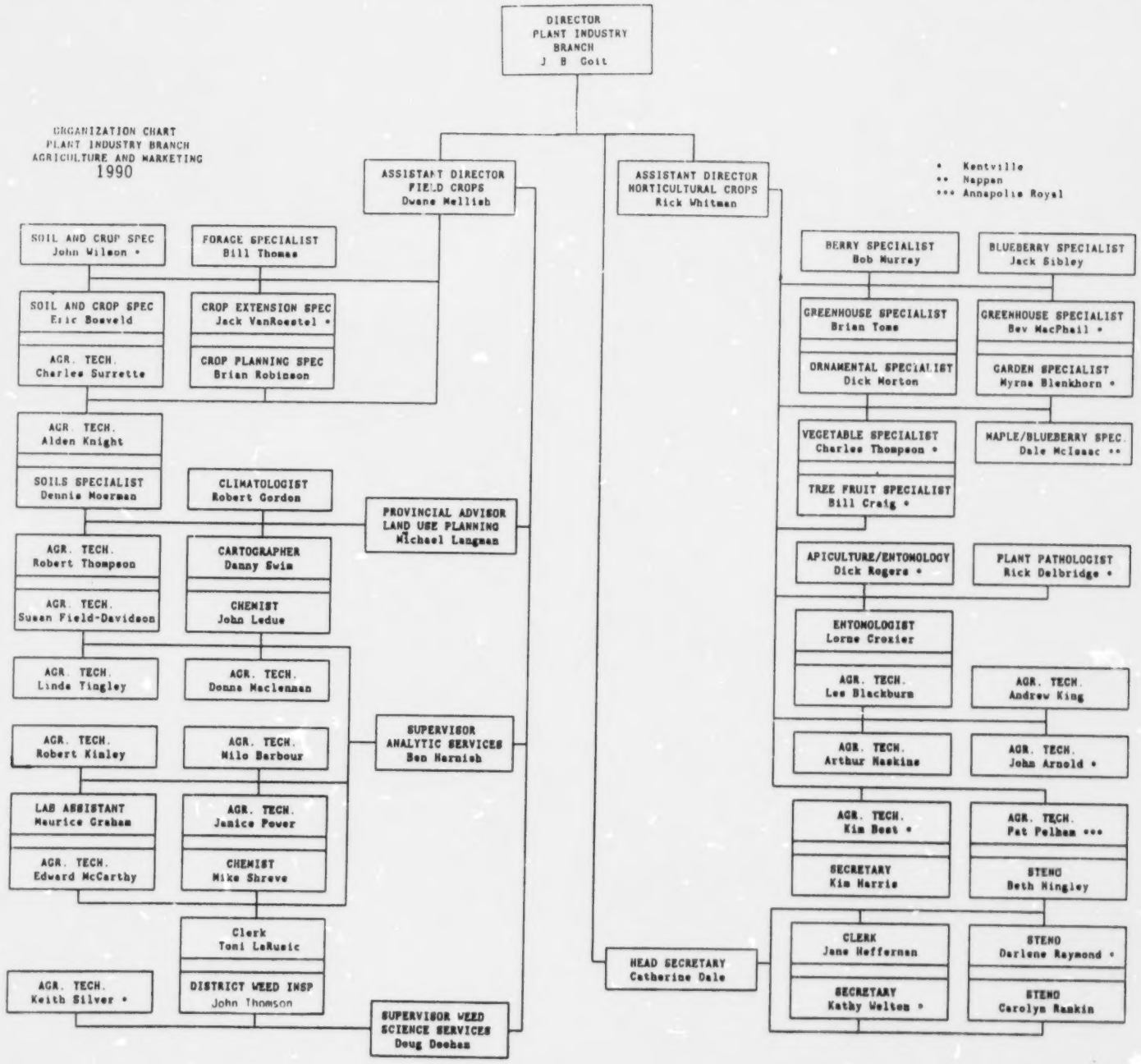
Table 1.5 shows the distribution of the size of claims made. More than 46% of claimants received less than $500 while only 2% received the maximum grant of $2500.

Table 1.6 shows the breakdown of claims on a county basis. The larger agricultural counties such as Kings, Colchester, Hants and Cumberland received the most assistance.

Table 1.7 shows the area of crops on a county basis. It should be noted that *forage crops* represented almost 70% of the indicated hectares fertilized.

The total of 100942 ha represented about 66% of what statistics would show as "improved farm land" in Nova Scotia. This compares to 78000 ha indicated as fertilized in the previous year.

The most popular grade of fertilizer used in Nova Scotia during 1987 was 17-17-17. Almost $2M was spent on this grade alone (almost 30% of total). As forage is the most widely fertilized crop it is not surprizing that 17-17-17 and 12-24-24 are so widely used as they are common grass fertilizers in Nova Scotia. A summarization of the most common grades used is shown in Table 1.8.


ORGANIZATION CHART
PLANT INDUSTRY BRANCH
AGRICULTURE AND MARKETING
1990
DIRECTOR
PLANT INDUSTRY
BRANCH
J B Coit
ASSISTANT DIRECTOR
FIELD CROPS
Dwane Mellish
ASSISTANT DIRECTOR
HORTICULTURAL CROPS
Rick Whitman
* Kentville
** Nappan
*** Annapolis Royal
SOIL AND CROP SPEC
John Wilson *
FORAGE SPECIALIST
Bill Thomas
SOIL AND CROP SPEC
Eric Bosveld
CROP EXTENSION SPEC
Jack VanRoestel *
AGR. TECH.
Charles Surrette
CROP PLANNING SPEC
Brian Robinson
AGR. TECH.
Alden Knight
SOILS SPECIALIST
Dennis Moerman
CLIMATOLOGIST
Robert Gordon
PROVINCIAL ADVISOR
LAND USE PLANNING
Michael Langman
AGR. TECH.
Robert Thompson
AGR. TECH.
Susan Field-Davidson
CARTOGRAPHER
Danny Swim
CHEMIST
John Ledue
AGR. TECH.
Linda Tingley
AGR. TECH.
Donna Maclennan
AGR. TECH.
Robert Kinley
AGR. TECH.
Milo Barbour
SUPERVISOR
ANALYTIC SERVICES
Ben Hornish
LAB ASSISTANT
Maurice Graham
AGR. TECH.
Edward McCarthy
AGR. TECH.
Janice Power
CHEMIST
Mike Shreve
Clerk
Toni LaRusic
AGR. TECH.
Keith Silver *
DISTRICT WEED INSP
John Thomson
SUPERVISOR WEED
SCIENCE SERVICES
Doug Doohan
BERRY SPECIALIST
Bob Murray
BLUEBERRY SPECIALIST
Jack Sibley
GREENHOUSE SPECIALIST
Brian Toms
GREENHOUSE SPECIALIST
Bev MacPhail *
ORNAMENTAL SPECIALIST
Dick Morton
GARDEN SPECIALIST
Myrna Blenkhorn *
VEGETABLE SPECIALIST
Charles Thompson *
MAPLE/BLUEBERRY SPEC.
Dale McIsaac **
TREE FRUIT SPECIALIST
Bill Craig *
APICULTURE/ENTOMOLOGY
Dick Rogers *
PLANT PATHOLOGIST
Rick Delbridge *
ENTOMOLOGIST
Lorne Crozier
AGR. TECH.
Lee Blackburn
AGR. TECH.
Andrew King
AGR. TECH.
Arthur Haskins
AGR. TECH.
John Arnold *
AGR. TECH.
Kim Best *
AGR. TECH.
Pat Pelham ***
SECRETARY
Kim Harris
STENO
Beth Hingley
HEAD SECRETARY
Catherine Dale
CLERK
Jane Heffernan
STENO
Darlene Raymond *
SECRETARY
Kathy Welten *
STENO
Carolyn Rankin

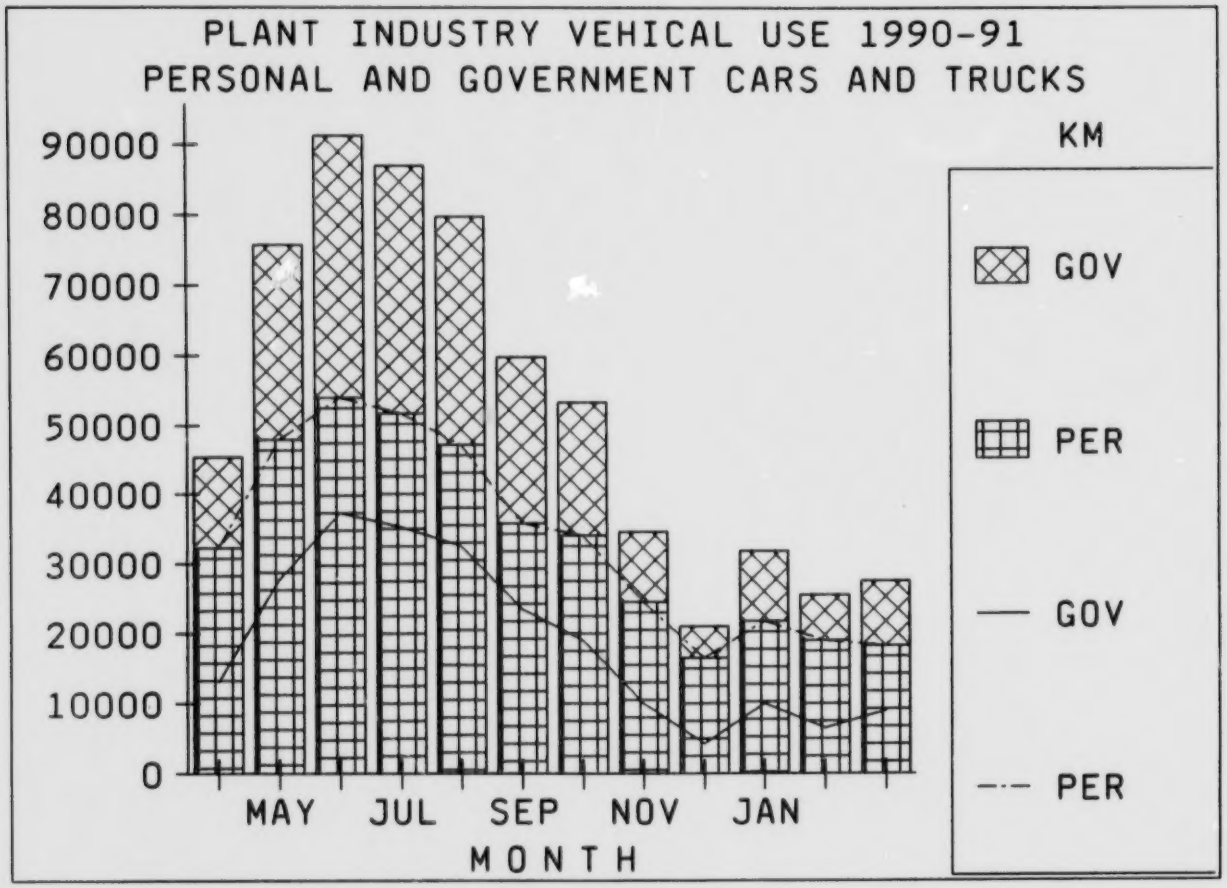

PLANT INDUSTRY VEHICAL USE 1990-91
PERSONAL AND GOVERNMENT CARS AND TRUCKS
KM
90000
80000
70000
60000
50000
40000
30000
20000
10000
0
MAY
JUL
SEP
NOV
JAN
MONTH
GOV
PER
GOV
PER

Table 1.3: Historic Expenditures – Fertilizer Assistance Policy

Policy Year	No. of Applications	Average Application	Total Expenditure
1990–91	1623	$737.91	$1,203,810.90
1989–90	1806	$874.63	$1,579,589.90
1988–89	2075	$777.70	$1,613,697.99
1987–88	2079	$725.20	$1,507,681.94
1986–87	2075	$698.15	$1,448,659.61
1985–86	2251	$695.09	$1,564,666.79
1984–85	2387	$660.83	$1,575,398.26
1983–84	2430	$655.17	$1,592,070.65
1982–83	2481	$638.30	$1,583,628.30
1981–82	2471	$603.69	$1,499,952.27

Table 1.4: Number Of Fertilizer Applications Per Farmer

Number of Applications	Applicants
1	1632
2	103
3	4
Total	1739

Table 1.5: Breakdown Of Fertilizer Policy Claims by Amount

Claim Size Range	Number of Claims	Total $ Claimed
$2500	42	105,000.00
$2499–2250	16	38,204.09
$2249–2000	22	46,705.03
$1999–1750	38	70,216.23
$1749–1500	79	127,349.77
$1499–1250	121	165,369.79
$1249–1000	167	188,283.80
$999–750	154	131,709.08
$749–500	236	144,132.06
$499–250	344	120,707.64
$249–100	411	65,950.83
< $100	3	280.19
TOTAL	1632	1,203,810.90

Table 1.6: Fertilizer Assistance Policy 1990–91

County	No. of Claimants	Average Claim	Total Expenditure
Annapolis Co.	84	$681.88	$57,278.13
Antigonish Co.	117	$838.57	$98,112.21
Cape Breton Co.	56	$650.58	$36,432.57
Colchester Co.	208	$827.02	$172,019.20
Cumberland Co.	153	$678.65	$103,834.01
Digby Co.	14	$275.69	$3,859.63
Guysborough Co.	20	$375.05	$7,501.00
Halifax Co.	53	$795.82	$42,178.47
Hants Co.	201	$778.42	$155,684.95
Inverness Co.	69	$685.41	$47,293.63
Kings Co.	343	$906.29	$309,952.50
Lunenburg Co.	109	$413.58	$45,080.69
Pictou Co.	144	$636.48	$91,652.83
Queens Co.	6	$341.29	$2,047.72
Richmond Co.	5	$321.19	$1,605.96
Shelburne Co.	2	$278.90	$557.81
Victoria Co.	11	$653.96	$7,193.59
Yarmouth Co.	37	$554.41	$20,513.23
Total	1632	$737.91	$1,203,810.90

Table 1.7: Hectares of Fertilized Crop Per County - 1990–91

COUNTY	CORN	FORAGE	GRAIN	VEG	TREE FRUIT	SMALL FRUIT	OTHER
Annapolis Co.	216.0	3494.4	991.2	171.1	86.8	19.1	39.8
Antigonish Co.	.0	6671.9	777.1	4.0	.0	21.5	.0
Cape Breton Co.	4.0	1902.7	142.2	172.6	46.0	14.6	157.2
Colchester Co.	489.5	13908.8	1306.4	334.6	.6	279.3	160.5
Cumberland Co.	8.0	5793.8	2469.0	226.6	.0	1017.0	40.0
Digby Co.	.0	264.0	42.0	8.8	10.0	5.8	.0
Guysborough Co.	.0	575.5	55.6	.5	.0	.0	.0
Halifax Co.	22.5	3760.4	315.1	.0	.0	26.0	54.4
Hants Co.	433.8	11931.9	1037.5	84.9	150.5	145.4	1041.7
Inverness Co.	.0	3244.2	171.1	16.0	.0	8.0	60.0
Kings Co.	1291.3	8494.6	5173.2	3262.4	3299.6	148.6	1204.1
Lunenburg Co.	21.7	3379.7	165.4	55.0	37.1	14.6	7.2
Pictou Co.	180.9	5760.2	1556.6	53.0	.8	142.2	5.0
Queens Co.	.0	107.7	8.0	.8	.0	.0	.0
Richmond Co.	.0	111.2	6.5	.8	.0	20.0	.0
Shelburne Co.	.0	30.0	.0	.0	.0	1.5	.0
Victoria Co.	.0	664.9	8.0	10.4	.0	.0	.0
Yarmouth Co.	3.0	1185.7	2.0	14.7	17.0	7.6	7.3
Total	2670.7	71331.6	14226.9	4416.2	3648.4	1871.2	2777.2
% Of Total Crop	2.6	70.7	14.1	4.4	3.6	1.9	2.8
% Of Total Group	3.0	80.8	16.1	44.4	36.7	18.8	100.0
Total Crop Fertilized	100942.2						
Total Field Crop	88229.2	87.4%					
Total Hort Crops	9935.8	9.8%					
Total Other Crops	2777.2	2.8%					

Table 1.8: Common Grades Of Fertilizer

GRADE	$ SPENT BY FARMERS	NUMBER OF CLAIMS
0-0-60	$73,034.38	133
10-10-10	$94,513.95	187
12-24-24	$793,537.20	691
17-17-17	$1,995,988.00	1212
18-46-0	$88,238.13	82
18-6-18	$589,359.20	435
19-19-19	$96,379.57	64
21-6-18	$102,017.08	40
34-0-0	$771,866.80	676
46-0-0	$282,845.60	211
5-20-20	$110,059.30	150
6-12-12	$74,947.97	187
Total For All Types	$6,779,293.00	6117

Chapter 2

AGRONOMY SECTION

By Dwane Mellish, Assistant Director — Field Crops

2.1 OVERVIEW

The Agronomy Section is composed of specialists in cereals, forages, crop planning and in the general areas of Soils & Crops. An Agronomist working with the Cape Breton Federation of Agriculture, funded with assistance from the Canada/Nova Scotia Livestock Feed Initiative (ALFI) continued to work closely with the agronomy team. Two Agricultural Technicians within the section assisted in conducting research and demonstration trials.

The Section planned and participated in a great number of extension type activities, including information meetings, seminars and field tours. Section staff had a major role in delivering the Field Crops Expo '90 program which was the result of three years of planning and delivery. In addition to these activities the section carries a heavy compliment of field research and demonstration trials. Crop Specialists work closely with County Soil and Crop Improvement Associations and the findings of the research and demonstration trials can be found in the Annual Soil and Crop Project Summary Booklet.

The following section indicates the activities of the various specialists, as well as the activities of the various commodities for which responsibility falls to this section.

2.2 FORAGE CROP REPORT

The 1990 forage crop yields in Nova Scotia were variable, and highly dependant upon localised weather patterns and soil drainage status. The season began with cool and wet growing conditions during much of the month of May. Some areas in Northern Nova Scotia received almost three times the normal rainfall in May and substantially less growing degree days as well. In fact, some weather stations reported receiving in excess of 375mm during the months of April and May (200mm more than last year) and at the same time reported that growing degree days were 75% below last years pace. Obviously, this had major influence on the development of the 1990 crop. Those with substantial amounts of subsurface drainage faired relatively well considering the conditions.

Early season efforts on part of the crop specialists' was directed towards the assessment of winter kill and injury. Frost heaving of legumes on heavy textured and exposed fields was fairly widespread. In a significant number of cases red and white clover roots were pushed 5-7cm out of the ground.

The combination of the weather conditions and significant winter injury (in some areas) reduced the yield of the first cut in the Central and Eastern regions of the Province. In fact, the yield was substantially less than normal and much less than last year. Many farmers reported that it took a much larger acreage to fill their silos this year or they were unable to fill it with first cut when normally it has been no problem.

Those who waited until the latter part of June found that yields were similar to normal early to mid June yields. However, within local communities there was a tremendous variation in the yields based entirely on the drainage status of the local soils. Even within fields, variability in the soil drainage had an easily observable effect on the forage growth.

Conversely, the Annapolis Valley and much of the Western region of the Province experienced a respectable first crop yield. Although, this region experienced less than ideal growing conditions during May as well, the regions climate is sufficiently different resulting in a speedy recovery of the forage growth during the latter part of May and early June. Furthermore, the general drainage status of much of the agricultural soils in the Annapolis Valley is better than many other regions in the Province.

Pasture growth was also affected by the adverse growing conditions early in the season. Many dairymen in the Eastern part of the Province let their cattle out in mid-May, grazed what was there and were forced to bring them back into the barn due to the slow pasture growth. This had a significant impact on the forage carry-over from last year. Many farmers reported emptying silos or hay mows that haven't been emptied for years.

Generally, the quality of the first crop was quite good since maturity was delayed in many areas. Nitrate leaching was expected to be the cause of some pale orchardgrass and timothy crops in the Annapolis Valley. Haylage harvesting conditions were relatively good in most areas resulting in very little field losses due to rain or unfavorable wilting conditions. Hay making farmers in the Central and Eastern region had difficulty harvesting any large volumes during June. However, in the Annapolis Valley it was estimated that 20-30% of the hay crop was in the barn by the end of June.

The growth and development of the second crop was entirely dependant upon the soil drainage and the timing of the first cut. By late June and early July most areas were in need of rain. Well drained fields that were cut late had virtually no regrowth in many cases. The fields that were cut early and had some capacity to hold moisture had excellent regrowth. Unfortunately, these fields were few in number since many farmers had delayed their first cut to improve the volume. Fields with decent regrowth started to lose yield by late July due to leaf senescence caused by the drought.

Pasture growth slowed much earlier than normal in many regions due to the dry conditions. Many cattlemen started supplementing their pastures with stored feed much earlier than normal. Those who had relatively new seeded, improved pastures found that in some cases they would not have had any pasture at all had it not been for the improved varieties of white clover and orchardgrass.

The combination of lower than normal first cut yields, poor regrowth of the second crop (nonexistent in many cases), the smaller than normal carry-over from last year and the poor pasture growth left many farmers worried whether they would be able to meet their herd's forage requirements. This necessitated the harvest of a third crop on many farms in which this was not a common practice. Those who normally harvested some fields a third time took a third cut on a larger number of fields this year. In many cases the third cut yield was higher than the second, especially if the second crop was harvested in July.

The quality of both the second and the third crop was generally excellent whether it was harvested as hay or as haylage. This can be attributed to ideal wilting and harvesting conditions.

Eventhough, many farmers started feeding stored forage earlier than normal, most should have enough hay and/or haylage to get them through the winter. This can be attributed to the fact that many had fairly respectable third cuts or they have more land than is needed in a normal year.

Custom haylage operators were busy this year with a number of new contractors joining the business. Custom wrapped roundbale haylage became very popular this year with a large number of farmers in some regions taking advantage of the service. At least six wrappers were purchased in Antigonish Co., all offering custom services. Several wrappers were purchased in the Central region as well and a very rough (guess) estimate of wrapped roundbales in the two regions would be 20000. Unfortunately, the plastic stretch film has deteriorated in too many cases and has necessitated rewrapping of a large number of round bales. The manufacturer of the plastic has taken the responsibility and farmers have been compensated to a certain degree. However, there is no doubt that this experience will affect the number of repeat customers for the contractors next year.

2.3 NOVA SCOTIA HAY MARKETING ACTIVITIES

The majority of hay marketing efforts in Nova Scotia can be grouped into two major areas of activity. The first is the activities associated with the Nova Scotia Hay Producers Association and in Middleton, Scotia Hay Co-op. The second area of activity is the hay that is sold domestically and to Newfoundland by individuals. Realistic statistics on the second group's activities are difficult to obtain, however the Scotia Hay Co-op is affiliated with Co-op Atlantic which acts as a brokerage for export hay in the region.

Newfoundland is the most important market, making up approximately 70-80% of annual sales of the Co-op. The viability of the co-op is primarily dependant upon this market and its ability to compete with other sellers in the region. In 1988-89 the Scotia Hay Co-op marketed close to 1400 tons of hay for 28 farmers for a total farm gate value of almost $96,000.

Tonnage exported in 1989-90 was approximately 1500 tons. Most farmers receive around $75-80/ton on average for their hay and are recognising the value of quality. Premium quality hay (+15% crude protein) pays $100/ton.

Currently, the Co-op has the ability to compact 2-2.5 tons an hour and could ship 150 tons in 7 days if necessary. This illustrates the yearly export potential for this organization, however it has been difficult in some instances to fill orders resulting in lost sales. Unfortunately, it has normally been a supply side problem. Buyers looking for a specific quality and type of hay have not always found enough tonnage at the Scotia Hay Co-op and subsequently go to other organizations. Difficulty in supplying large and important buyers, stems from two principle reasons. The first, is many farmers still have an attitude that hay sales are not worthwhile, although this attitude is changing with premium prices paid for quality, especially for those who are serious about hay production and marketing. The second reason, is that most livestock producers will market their high quality hay through their own animals and will sell only their lower quality hay.

Although Newfoundland is the primary market, other important markets have been developed. The Bermuda horse market has been relatively steady over the last few years for Scotia Hay Co-op at around 20 tons of timothy hay every three weeks for a total volume in 1988-89 of around 300 tons. Similar amounts were exported last year.

Hay has also been exported in the past to Scotland, the United Arab Emerates, the U.S.A. and Puerto Rico, however with the exception of Scotland in 1986, most have been relatively small quantities.

The Far East market is considered by many to be a tremendous potential for Nova Scotia. Taiwan has expressed interest in pure alfalfa hay and Japan is considering purchasing large quantities (20,000 tons) of late cut timothy hay from the Maritime Region over the next few years. The Japanese market is important because supply side limitations should be easily overcome. The Japanese need a source of fibre to feed along with alfalfa pellets, etc. and therefore are interested in very mature, couchgrass free timothy with large heads. The potential for production of this type of crop is tremendous in Nova Scotia since it can be grown on a wide range of soils, it will not conflict with other forage harvesting operations, it can not compete as a domestic livestock feed and because of the underutilized land base in significant agricultural areas. The key factor that will determine whether this market opportunity will materialise is the price farmers receive. If it can be demonstrated that there is money to be made, the production will follow.

Scotia Hay Co-op is currently able to handle larger volumes of hay, however, there are other regions in Nova Scotia which could benefit from this market. For example, there was close to 6400 tonnes of hay available for sale in eastern mainland Nova Scotia in 1986. This region produces a surplus each year which could be expanded. The North Shore of Nova Scotia and significant parts of Cumberland County are underutilised and could produce decent crops of timothy hay.

With the current cost of milk quota, and the poor return on investment for beef production, there exists a need in Nova Scotia for alternative forage marketing strategies. With the current low prices of grain, many farmers are reluctant to grow cash crop grain for either feed or milling purposes.

The need for the development of new options for farmers in Nova Scotia to prevent good farmland from producing nothing but alders cannot be over- emphasised. Currently, the necessary infrastructure for densified hay export is not in place throughout many regions in the province. Scotia Hay Co-op has made significant advances in the marketing of Nova Scotian produced hay, however if the Japanese (and other) markets are to be exploited, a price incentive is necessary.

2.4 CEREAL GRAINS

The 1990 growing year was a very difficult one for cereals in both growing conditions and price.

Winter cereal plantings in the fall of 1989 were reduced due to lower anticipated price for milling grains with the 1990 harvest. The crop survived the winter relatively well with only localised winterkill. Disease pressures were moderate but dry weather in late June and July resulted in lower than average grain yields due to poor grain fill. Quality of grain harvested was quite good.

Spring grain planting was delayed due to heavy and persistent rains during May. This wet and cold weather either delayed seeding or delayed emergence of early seeded grain. These conditions combined with a very dry July early August resulted in low grain yields.

2.5 NOVA SCOTIA GRAIN MARKETING BOARD

The Nova Scotia Grain Marketing Board (NSGMB) is a producer operated Board, which markets winter and spring grain, as well as corn, soybean, and canola. The Board takes an active role in producer issues, including industry meetings, research and development activities, crop scouting, as well as marketing.

The depressed price for milling wheat resulted in significant reduction in the tonnages being offered to the Board (Table). Similar tonnages of barley, feed wheat, and rye, were committed to the marketing pools. Oat volumes dropped significantly in both volume and grade.

Soybeans, although a small volume and slow market, are establishing themselves as being a high quality feed when roasted as a full fat bean. This market will be further developed in the future.

Table 2.1: 1990 Grain Pool Summary - with comparative figures for 1989 crop

	1989		1990	
Pool	Tonnes	Avg. Price*	Tonnes	Avg. Price*
Milling Wheat:				
Absolvent	3,123	199.56	1,554	170.63
Monopol	2,136	199.56	519	-
Perlo	508	194.75	421	179.23
Karat	246	193.09	984	-
Max	3,081	197.38	404	-
Katepwa/Roblin	537	205.24	-	-
Feed Wheat:	504	182.18	527	148.88
Rye	252	128.29	291	122.21
Barley	1,089	153.79	1,305	148.34
Oats	1,305	146.10	685	120.04
Hulless Oats	47	214.57	14	-
Corn	1,410	172.87	492	157.52
Canola	129	405.33	101	-
Soybeans	348	301.52	191	294.83
Totals	14,588		6,848	

* Avg. of tonnes sold to date

Notes:

1. Includes 1988 total.
2. 1989 Soybean pool remains open.
3. 1990 Milling wheat initial payments are weighted averages based on $147 for #1, $141 for #2, and $130 for #3. Producers received these rates, less drying charges.
4. 1990 Oats initial payment is a weighted average based on $106 for #1/#2 and $86 for #3/#4/sample. Producers received these rates, less drying charges.
5. Absolvent/Monopol sold as one pool in 1989/90.

2.6 CORN

1990 was a below average year for corn. Maturity and quality was excellent, but yield in the Western Region was substantially below normal.

Conditions for planting were ideal for the first 10 days of May. Conditions deteriorated considerably after May 10th. Excessive rain and unseasonably cold weather adversely affected the corn. Plant population was well below what was required to achieve an adequate yield. Cold, wet conditions affected some varieties more than others.

Although corn heat units at Kentville were below the 1989 average, they were above the 30-year normal. This allowed corn planted after June 1st to mature, but yields were very erratic.

Late planted corn on sandy soil succumbed to drought in the Western Region, while early planted corn was affected by cold, wet conditions.

There is considerable differences in corn varieties, in their ability to withstand cold, wet conditions. If corn hectarage is to increase, then these varieties will have to be identified and research will have to be initiated to improve corn's ability to withstand cold, wet soil conditions.

In spite of the dismal season for corn, seed sales this spring, for the most part, are up over last year's sales.

This means corn stover could be grazed and then chisel plowed or disked in the spring to help control erosion.

2.7 SOYBEANS

The growing conditions during the 1990 season were generally quite favorable for the growth and development of soybeans which resulted in higher than normal yields in most cases and excellent maturity. A wet May delayed planting in some areas, however the warm weather throughout the summer more than compensated for late plantings since many of the heat units came in July and August when the crops were well established.

Maple Amber and KG 20 were the varieties used in the Amherst region, both of which performed very well. A small replicated variety trial was set up for a second year in a row and has shown KG 20's yield superiority in both years. Growers in the Annapolis Valley grew both these varieties as well as Maple Isle and KG 30. Yields of KG 30 were as high as 4.0 t/ha with the lowest yielding site at a very respectable 3.0 t/ha. Maple Isle yielded approximately 2.7 t/ha. Overall yields were very good with an estimated average yield of approximately 3.0 t/ha for both the Annapolis Valley and Cumberland Co. regions.

Weed control was excellent in most cases with very few escapes. Linuron was the most popular broadleaf pre-emergent and was very effective. Some crop damage was noted on some fields with low organic matter levels when they were sprayed prior to a heavy rainfall. Metribusin was also used with equally good results, however no crop injury was noted. Metolachlor was used on many fields especially those with a known annual grass problem. Grass control was excellent and no crop injury was observed.

There has been considerable interest in the last couple of years in the use of extra nitrogen to promote early growth under cold soil conditions. Some research has shown this to be beneficial since nitrogen fixation is substantially delayed in cold soil. Certainly many growers feel that a small application of nitrogen at an early growth stage is beneficial and therefore many have been applying 50-60 kg N/ha; 20 kg N/ha at seeding and the remainder topdressed at the 4 leaf stage. Others have incorporated manure prior to planting to get the extra nitrogen. Some feel this should produce an extra 0.5 t/ha.

Most growers harvested their soybeans under good conditions and in a timely fashion. In fact, many in the Valley were able to seed a crop of winter wheat after the beans were combined. Moisture content at harvest tended to be in the 18-20% range. Harvest losses were not substantial in most cases, those with flex heads had significantly lower losses.

2.8 TOBACCO

Tobacco acreage dropped from 442 acres in 1989 to 440 acres in 1990.

Ten growers, down one from the year previous, produced 1,101,556 lbs. of tobacco, worth $2,326,962.00 for an average of 2,500 lbs./acre. The 1990 crop was a much better crop in terms of quality and yield from the 1989 crop. This added production in 1990 will probably mean additional acres cut in 1991.

Two variety trials were carried out in 1989 and for the first time, varieties superior in yield to Delgold were observed. Growers have been asked to increase their contribution to the research effort in the form of increased check-off on the pounds of tobacco that they produce.

Potato Virus Y Neucrotic has shown up in Potatoes on Prince Edward Island. It does not seriously affect potatoes, but it can seriously affect tobacco. To date, PVYN has not been found in any tobacco in the Maritimes. The Vector for transmitting the virus from potatoes to tobacco is aphid. The virus has a very short life in the aphid, that being approximately five hours. Unless infected potatoes are grown close to tobacco, the chance of PVYN spread to tobacco is not great. Tobacco fields will be monitored again this summer for Brown veining which indicates the presence of PVYN in tobacco.

2.9 SOIL & CROP IMPROVEMENT ASSOCIATION (S.C.I.A.) ACTIVITIES

During the past year, County S.C.I.A. Directors have worked closely with Soil & Crop Specialists and Agricultural Representatives to provide demonstrations and discussion on improved crop management practices. Although Association activities tend to be fairly similar from year to year, experience has proven that these "on farm" crop demonstration trials, crop competition/tours and winter cropping seminars provide the membership with the opportunity to gather on a county or regional basis and take part in valuable information exchange.

In 1990, there were 37 "on farm" demonstration and research trials of which many were toured and all have results reported in the annual Field Crops Project Results booklet. Besides the trial work, tours, and crop competitions, some relatively new S.C.I.A. activities were a County Plowing School, detailed Soil Fertility Sampling Service, and Association Tour Groups to Field Crops Expo '90. All these programs appeared to be fairly successful in encouraging the improvement in livestock feed yields and quality, as well as promoting sound agronomic practices within the Association's some 750 members.

2.10 FIELD CROPS EXPO '90

Field crops Expo '90 held on July 15-18, 1990 in Sheffield Mills and Wolfville, Nova Scotia was the largest crops extension event ever held in the Atlantic Region. The three and one-half day program had a total attendance figure of 2,314 people. These participants enjoyed the unique combination of an outdoor exhibition, indoor conference and social events, which made Expo '90 a truly "informative cropping season vacation".

Field Crops Expo '90 resulted from the organisational talents of a 14-member Steering Committee along with the financial support and interest from participating farmers, exhibitors, N.S. Federation of Agriculture, and the Canada/Nova Scotia Livestock Feed Initiative Agreement.

The intent of Field Crops Expo '90 was to hold an event that would attract all farmers involved in the production of forage crops, cereals and protein crops, regardless of the type, size, and location of their operation. The information to be delivered would be practical to farmers from across the Atlantic Provinces, and be presented in a way that would really catch the farmers' interest.

Field Crops Expo '90 featured:

1. A Sunday night opening ceremony/reception, with the Honorable Don Masankowski and the Honorable George Archibald giving addresses,

2. A two-day field exhibition on the 22 hectare (55-acre) site in Sheffield Mills. The program there consisted of crop management plot tours, 45 commercial exhibits, 60 working machinery demonstrations, and a plowing competition,

3. A one-day conference at Acadia University which had a Maximum Economic Yield theme address, 18 practical crop, soil and machinery management talks, and a "Bear Pit" session in the evening for informal discussion between speakers and participants,

4. Alternative tourist and children's programs were offered along with other social events.

To properly organise Field Crops Expo '90, a 14-member Steering Committee was formed in the fall of 1987. This group quickly developed working agreements with Acadia University, Wolfville and Wilmar Acres Limited, Sheffield Mills, to provide key facilities for the conference-social activities and the field exhibition, respectively.

In the spring of 1988, part-time manager, Janice Lutz, was hired to work with the Steering Committee and its five subcommittees. Throughout the next two years, the subcommittees (conference, site, publicity, and accommodations finance) worked on details of Field Crops Expo '90. These included the field exposition activities, conference format and speakers, accommodations, alternate programs, and publicity. In April of 1989, plotsperson, Sharon Campbell, was hired to look after all crop management and other activities at the field site. During the actual show on July 15-18, 1990, a part-time staff of 45 N.S.D.A.M. employees were assembled to assist Steering Committee members and exhibitors in all aspects of registration, conference, and field day activities.

Field Crops Expo '90 was well received by Atlantic Canada's crop farmers, agri- business reps., research, and extension personnel. A total attendance figure for the 3 1/2 day program was 2,314.

From the Sunday night opening ceremony to the final machinery demonstration on the second field day, most participants were very impressed by the organisation and information available at Field Crops Expo '90.

On the conference day, many of the 456 individuals that attended were most satisfied with the quality of presentations given by the 18 speakers that were invited from various parts of North America. The topics consisted of Soil Nutrient Management, Grazing Systems Approaches, Feeding Quality Haylage and H.M.E.C., Tillage Management, Field Equipment Selection, etc. and most presentations had a good mix of practical information and current research findings. Copies of these are still available in the booklet, Field Crops Expo '90; Conference Presentations.

The two field days in Sheffield Mills held at the 22-hectare temporary "tent city" and crop site were also very successful. Participants could view a wealth of information contained in the 4 hectares of crop management plots, 45 commercial exhibits, over 300 pieces of field machinery of which 60 were demonstrated in actual crop conditions, and the provincial plowing match. Despite temperatures that ranged between 31-34 degrees C, 1,349 individuals attended the field exhibition, left requesting another show in the near future.

In judging from the various comments received during the show and the evaluation forms, it is obvious that Field Crops Expo '90 was successful in delivering a wealth of practical information and the leading edge of technology to Atlantic Canadian field crop (forages, cereals, and protein crops) farmers. From all indications, the farming community would like to see another event of this magnitude offered again in the next 3-5 years.

Chapter 3

TREE FRUITS

By Bill Craig, Horticulturist

3.1 OVERVIEW

Below average temperatures during December 1989 resulted in minor tree losses and damage to apple trees. Stone fruit trees and fruit buds were more adversely affected by these temperatures and fluctuating temperatures in February and March as stone fruit production was down by almost 50 percent in 1990. The growing season, with the exception of cool wet weather during most of May, was well suited to tree fruit production. A total of 14 apple scab infection periods were recorded from May 1 to July 30 which was 10 fewer than the number recorded in 1989 for the same time period. Fruit maturity was advanced 2 to 3 days from normal due to the warm growing season. Warm temperatures continued into the fall which advanced fruit maturity more rapidly than normal. The warm temperatures and dry conditions did increase the incidence of premature drop and are blamed for soft fruit coming out of cold and C.A. storage. Most growers did not experience problems in obtaining harvest labour.

The 1990 apple crop was estimated to be 3,300,000 bushels which would be up 22 percent over 1989 production of 2,700,000 bushels. The pear crop was estimated at 50,000 bushels identical to that of 1989 while stone fruit production was placed at 3,500 bushels down 46 percent from the 6,500 bushels in 1989. The farm gate value of the 1989 apple crop was $8,610,000; however, stabilization payments totalling $1,470,000 plus $500,000 in Federal/Provincial assistance will increase the value to $10,586,000. The farm gate value for pears was $495,000 and plums $116,740. The total value of the 1989 tree fruit crop would be in excess of $11,191,740 which compares to a value of $12,621,900 for 1988.

A surplus of processing apples in the fall resulted in a significant volume of peeler and juice apples to be shipped to the USA, Ontario and Qubec. Prices for processing apples in the fall were similar to those of 1989. The price for juice apples; however, had increased to 8 cents per pound in February 1991 from 4.25 cents per pound. Fresh fruit prices in the fall started off similar to those received in 1989, however, fell by $1.00 to $2.00 per carton by early November. A small volume of Gravensteins were sold on the Toronto market as a result of a NSFGA promotional program. The NSFGA hopes to expand markets for Gravenstein in future years.

Approximately 4,600 bulk bins were built under the Bulk Bin Construction program. A total of 6 C.A. operators and 7 packers of C.A. apples were certified under the C.A. storage operator and packer regulations. A total of 143 apple producers were enrolled in the apple tripartite stabilization program for 1990. A premium of $6.25 per tonne was collected on approximately 55,000,000 kgs of apples. Stabilistion payments totalling 3.96 cents per kg were made on the 1989 apple crop. In December the provincial government provided an additional $500,000 for assistance on the 1989 apple crop. An additional $300,000 was made available for a high density orchard planting program.

3.2 GROWING SEASON

Climatic conditions during 1990 were generally favorable for tree fruit production. Winter injury to apple trees which became apparent in May and June is attributed to below-average temperatures during December 1989. A minimum of -21°C was recorded at Kentville on December 25 and the mean for the month was -8.6°C, well below the 30 year average mean of -2.4°C. Fruit bud injury was observed on the more tender cultivars such as Gravenstein in orchard blocks located in the colder areas of the Valley. The bud damage varied from tree to tree in the orchard and in most cases only affected 20 to 60 percent of the flowers. This damage had a negative effect on a very small portion of the crop. Tree damage in the form of cambium injury on the tree trunk was noted in several orchards. One producer in Melvern Square had sufficient tree losses to trigger a crop insurance payout. The mean temperatures for January, February and March were -1.8, -4.3 and -0.5 which were above the 30 year averages of -5.0, -5.2 and -1.0°C. The minimum temperature recorded for this period was -23.5°C on February 27. Temperatures during these months fluctuated with a high of 17°C being recorded January 26. Above normal winter damge to stone fruits occurred in 1990 due to the fluctuating temperatures and below average temperatures in December 1989. The Japanese type plums and peach trees sustained the greatest damage to flower buds.

Snowfall total for the period of January 1 to April 30 was 147.8 cm which was below that of 1989 177.3 cm and the 30 year average of 201.3 cm. The greatest depth of snow on the ground at Kentville was 28 cm recorded on February 25. Thaws in January, February and March limited snow cover and snow cover had disappeared by mid-March.

The mean temperature for April was 6.1°C which was above the 30-year average of 4.4°C. The warmer temperatures did not result in earlier than normal bud development as green tip was not observed on apples until April 28th. Temperatures during May, however, were below average with a mean of 9.4°C compared to a 30-year average of 10.4°C. The last recorded spring frost of -1°C was recorded on May 26 which was the only frost recorded at Kentville in May. Minor frost injury to fruit buds was observed in low lying areas of the Valley. The cool weather during May slowed flower bud development and peak apple bloom did not occur until June 2-3 which compares to a peak period of May 24-26 in 1989.

Precipitation for the month of May totalled 198.4 mm, well above the 30-year average of 75.0 mm. Wet, cool weather during the bloom period of stone fruits and pears is attributed for a poorer fruit set of these tree fruits. Apple blooms on the other hand occurred during a relatively dry period.

Temperatures for June, July, August and September were above average while precipitation was below average. A total of 197.2 mm of rainfall for this period compared to the 30-year average of 324.5 mm. Degree days above 5°C from May 1 to September 30 totalled 1,751.5, above the 30 year average of 1,629.4, but below last year's total of 1,802.4. Hours of bright sunshine for this period totalled 1,063.5 hrs which was slightly above the 30 year average of 1,057.5 but below last year's total of 1,118.6 hrs.

Although precipitation was higher than normal for May, the remainder of the growing season was dry which resulted in a reduction of the number of apple scab infection periods. A total of 14 infection periods were recorded from May 1 to July 30 which was 10 fewer than recorded in 1989. Heavy rainfall and long infection periods during May are to blame for the majority of scab observed. The incidence of fruit scab infections was normal and did not present a major problem to growers. The incidence of late pinpoint scab was, however, up in 1990 due to a change in fungicide usage. The EBDC issue resulted in an extension to the days to harvest interval from 30 days to 45 days. Captan replaced an EBDC fungicide in the final fungicide application of the season, however, captan is not as effective in controlling late season and storage scab. Growers that experienced problems appled captan in late July as the final fungicide spray.

Powdery mildew was occasionally observed during the growing season but was not a major problem for growers. Fireblight on apple trees was once again observed in the Round Hill area of Annapolis County. At this time fireblight does not appear to be spreading to apple orchards outside of this area.

An excellent to good bloom was observed in most orchards and pollination conditions during the bloom period were considered good. The amount of bloom and subsequent fruit set promoted an increase in the usage of bloom and post-bloom chemical thinners. A heavier than normal fruit drop occurred during the early part of July. The heavy drop is attributed to an overset of fruit on the trees and the cool wet weather preceding bloom. Dry warm weather following bloom was conducive to good fruit growth, however, extended

dry periods in July and August did have a negative effect on fruit size particularly in orchards located on droughty soils. Fruit maturity was slightly behind that of 1989 but advanced of a normal year. Ethrel-treated Gravensteins were being harvested during the week of August 20–27 with the bulk of the Gravensteins being harvested between September 7 to 17. Maturity testing of McIntosh indicated that spot picking for C.A. cold storage could have begun on September 17 which was 3 days later than 1989's starting date but is still considered as an early starting date.

The mean temperatures for September -14.6°C and October -11.8°C were higher than those of the 30-year average. Precipitation for September, 55.2 mm, was below average while that for October, 126.8 mm was above average. The warm and dry weather was conducive for harvesting, however, the warm temperatures and dry soil conditions did advance maturity and delayed the onset of fruit color. Premature fruit drop was a problem particularly on older trees carrying a full cropload. The dry soil conditions are felt to have contributed to the drop. Premature fruit drop was only a problem for McIntosh and Spartan. Adequate harvest labor was available to most growers, however, several growers did not have a sufficient labor force to harvest the fruit at the optimum maturity. The first frost of -2°C was not recorded until October 21 and harvest time was not lost due to frozen apples. The majority of growers were able to complete the picking of apples the last week of October. The picking up of juice apples carried over into November. There were a few producers that were still picking up juice apples in early December.

3.3 PRODUCTION AND MARKETS

The preliminary estimate for the 1990 apple crop was set at 3,300,000 bushels which is 22 percent higher than last year's crop of 2,700,000 bushels and 9 percent above the 5 year average. The 1989 crop, which at one time was estimated at 2,300,000 bushels, was set at 2,700,000 bushels down 36 percent from the 1988 crops. The August estimate for the 1990 Canadian apple crop was 25,896,000 bushels. An October estimate placed the US crop at 225,524,000 bushels down 5 percent from 1989 but up 4 percent over the 5 year average. Production in the eastern region was up while that in the central and western regions was down.

December storage holdings were 1,000,000 bushels up 70 percent over 1989 holdings for the same period. C.A. holdings were 76 percent higher than 1989's for this period and 13 percent lower than the record holdings for 1988. Eighty percent of the storage holdings on December 1 were for fresh fruit sales.

The 1989 market season for fresh fruit sales started off strong but weakened in mid-October as increased volumes of fruit became available on the marketplace. In early November f.o.b. packer returns for 12 x 3, 8 x 5, cello bags were $10.50 – 13.50 which compare to returns of $10.50 – 13.50 for this period in 1989. Gravensteins were placed on the Toronto market for the first time as a result of a NSFGA marketing program. Movement of Gravensteins on this market, approximately 2,000 bushels were modest but it is hoped that this market can be developed to take a significant volume of Gravensteins.

The export of fresh fruit apples declined in 1989 as a result of the smaller crop and stronger fruit prices on the local market. Exports for the 1989–90 crop totalled 75,426 bushels compared to 98,076 bushels for fresh fruit for 1988–89. Exports for 1988–89 totalled 358,762 bushels when exports of 260,686 bushels of processing apples are included. Great Britain has been Nova Scotia's traditional export market; however, in 1989–90 exports to the US were almost equal to those of Great Britain.

The Nova Scotia Apple Enterprise Study for 1989 reported a negative return of 27 cents per bushel. This is the third consecutive year that this study has reported a negative return for apples. The average return for fresh fruit was $4.61 per bushel, processing sales $3.01 per bushel and juice apples $1.73 per bushel for an average return of $3.29. This compares to 1988 returns of $3.61 per bushel for fresh fruit, $3.12 for processing, $1.87 for juice and an average return of $3.02 per bushel. Expenses per bushel were $3.56 compared to $3.22 in 1988. The increase in the per bushel expenses is mostly due to the decline in yield which averaged only 325 bushels per acre compared to 505 bushels in 1988. Statistics Canada's average return for apple in 1989 was $3.19 per bushel up from 1988's return of $3.03 per bushel.

Provincial assistance totaling $500,000 was paid on the 1989 crop based upon producer sales for the crop. The assistance was announced at the NSFGA Annual Meeting with the funding being jointly provided

by Agriculture Canada and the NS Department of Agriculture and Marketing. This funding is additional to the $1,470,000 paid out under the NTASP to NS producers.

The NSFGA took part in national discussions on the formation of a national marketing board. Local hearings were held throughout the Valley to inform producers about the proposed board for fresh fruit and to allow producers to voice their concerns. A public hearing was held at the Old Orchard Inn on August 9 at which time groups or individuals had the opportunity to make submissions in support or against the formation of a national marketing board for apples. Public hearings in the five apple producing regions have been completed and the information has been submitted to Ottawa.

3.4 PROCESSING

A total of 1,732,570 bushels representing 64 percent of the 1989 crop were utilized for processing purposes. There was a 60 percent decline in the volume of apples processed from the previous year as a result of the smaller crop. The farm gate value for processing apples in 1989 was placed at $2,963,326 which was down significantly from the 1988 value of $6,821,153. The decline in farm gate value was not only due to the reduction in yield but also to lower prices paid for processing apples. Unlike 1988's crop when 493,546 bushels were sent to processing firms outside of the province the majority of processing apples were handled by local firms.

Prices offered at the start of the 1990 harvest season for processing apples were similar to those of 1989. The juice price for early cultivars and Gravensteins was $3.75 per cwt and $4.00 to $4.25 per cwt for hard apple cultivars. The price for juice apples was increased from storage, however, only a very small portion of the juice apple volume will receive this higher rate of return. It is interesting to note that juice prices over the past 10 years have ranged between $3.75 to $6.00 per cwt with an average of $5.00 per cwt.

The prices offered for peelers were $6.00 to $6.50 per cwt with the exception for Spy which returned $9.00 to $10.00 per cwt. The supply of peeler apples exceeded the demand by local processing firms which resulted in shipments of peeler apples to the US and Ontario. Scotian Gold Co-op co-ordinated the shipment of a large volume of peeler apples out of the province. The supply of juice apples in the fall exceeded local processing capabilities which resulted in long delays in delivery at the plants. This inability to handle all apples resulted in juice apples being shipped out of the province to the US.

The present financial weakness of local processing firms and low returns for processing apples is of major concern to the industry. If returns for processing apples do not strengthen, the supply of processing apples will decline as older orchard blocks will be removed more rapidly.

3.5 PEAR AND STONE FRUIT

The 1990 pear crop was estimated to be 50,000 bushels which would be identical to that of 1989. No significant winter damage to pear trees or fruit buds was observed and only slight fruit bud damage occurred as a result of frost on May 26th. A good bloom was observed in most orchards, however, wet cool weather during the early portion of the bloom period prevented a full crop set in many orchards. A warm dry growing season produced pears of good quality with soluble solid levels of 9-10 for Clapp's Favorite and 10-11.5 for Bartlett. As always fruit size was a concern at the start of harvest as fruit was in the small to medium size range. Pressure testing indicated that the harvesting of Clapp's Favorite could have begun on August 20 and Bartlett on September 7. These starting dates were similar to those of 1989 and are considered at the early end of the harvest period for these two cultivars. No major disease or insect problems were reported.

The bulk of the 1989 pear crop was sold as fresh fruit within the Atlantic region with a small volume of Clapp's Favorite placed on the Montreal Market. Cull pears in 1989 and 1990 were accepted by J.B. Foods for juice production. The pear juice was used to produce a pear Gravenstein drink, which was introduced for the first time in 1989. A price of $3.75 per cwt was offered for cull pears in both years. The average farm gate return for the 1989 pear crop was $9.90 per bushel which was up over the 1988 average of $8.31. The farm gate value for the total 1989 crop was $495,000. Wholesale to retail price quotations for September 28 indicate that returns for 1990 were up slightly over those of 1989. The quote for 4 x 4 L, Clapp's Favorite

was $10.03-10.69 which compares to a quote for $9.00 - 9.48 for the same period in 1989.

It is estimated that the 1990 plum crop will be down 46 percent from the previous year as a result of winter damage to fruit buds and trees and poor pollination due to wet cool weather during the bloom period. The 1990 plum crop was estimated to be 3,500 bushels which compares to 6,500 bushels for 1989. The majority of the decline in production occurred for Japanese type plums which are not as hardy as the European types. The average farm gate value for plums in 1989 was $17.96 per bushel, up significantly over the $12.54 per bushel return in 1988. The farm gate value of the total plum crop was $116,740 in 1989. The plum crop was sold as fresh fruit within the Atlantic region.

Peach and cherry production was also down significantly in 1990 due to the weather conditions.

3.6 INNOVATIVE DEMONSTRATIONS

3.6.1 Demonstration Orchard - Scab Resistant Cultivars

General horticultural maintenance was carried out on the eleven scab resistant cultivars. One insecticidal spray was applied to control stinging bugs. One half of the trees received five applications of Wuxal calcium spray and its effect on bitter pit control was evaluated. Trunk cross section measurements and yield per tree were recorded. Fruit from the orchard was utilized in a taste test and storage study.

3.6.2 Orchard System Trial

Trunk cross section measurements and yields were recorded for McIntosh and Idared trees in a commercial orchard systems trial. Tatura V Trellis, Vertical Axis and a free standing High Density training system are being compared with that of the 155 system.

3.6.3 Pear Rootstock Trial

A pear rootstock trial was set out on three grower locations and at the Kentville Agricultural Centre. The trial will compare three cultivars - Clapp's Favorite, Swiss Bartlett and Conference on 4 rootstocks: Quince A, OH X F69, OH X F87 and OH X F333. This is a joint project involving the NSFGA, Agriculture Canada and NSDAM.

3.6.4 Apple Rootstock Trial

An apple rootstock trial was set out on six grower sites and at the Kentville Agricultural Centre. The trial will compare seven rootstocks: Mac 1, M 4, M 7, M 26, KSC-28, MM 106, Bud 490 and self-rooted Macspur, grafted to the cultivar Macspur McIntosh. This is a joint project involving the NSFGA, Agriculture Canada and NSDAM.

3.6.5 Commercial Performance of Gloster 69 on Dwarfing Rootstock

The yield of Gloster 69 on the rootstocks M 9 EMLA and M 26 EMLA was recorded from a commercial planting which was established in 1988. The average yield per tree and weight per acre were determined.

3.6.6 Chemical Thinning Trial

Mature spur-type Red Delicious were treated with six chemical thinning treatments: Elgetol, NAA, Amid-thin, Sevin and NAA plus Sevin. Average yield per tree and weight per apple were determined. This was a joint trial with Agriculture Canada.

Table 3.1: Bulk Bin Claims by County 1990

	BREAKDOWN BY COUNTY			
COUNTY	GROWERS	BINS	TREE FRUITS	VEGETABLE
Kings	38	3680	2999	681
Annapolis	4	175	125	50
Hants	4	480	480	–
Cape Breton	2	275	–	275
	48	4610	3640	1006

3.7 BULK BIN POLICY

By Myrna J. Blenkhorn, P.Ag.

The Bulk Bin Construction Assistance Policy is administered by the Plant Industry Branch. The assistance under the policy allows fruit and vegetable growers to construct up to 200 bins at $10.00 per bin — a maximum of $2,000 assistance (minimum number of bins eligible is 25). The bins are inspected and coded — each farm having its own code.

The total money allocated under this policy is $85,000 of which $46,100 was spent this year. A total of 72 applications were processed of which 49 were tree fruits and 23 were vegetables. Only 48 growers submitted claims (37 tree fruit growers and 11 vegetable growers), 24 growers did not build bins. A total of 4610 bins were constructed. A breakdown by county is shown in Table 3.1.

3.8 C.A. STORAGE OPERATOR AND PACKER REGULATIONS

In 1990 six cold storage firms applied for and were issued Certificates of Registration as Controlled Atmosphere Storage Plant Operator. Seven fruit packing firms applied for and were granted Certificates of Registration of Packer of Controlled Atmosphere Storage Apples. Gas levels in the registered C.A. Storages are routinely monitored by David Bowlby, the NSFGA Apple Inspector.

3.9 APPLE MAGGOT CONTROL BOARD

Myrna J. Blenkhorn, PAg.

The Apple Maggot Control Board met twice in 1990 (April and November). Routine business was carried out at both meetings such as Manpower commitments for the Fall Survey, apple maggot infestations and dealing with the results of the Fall Survey. The present board membership consists of Gerard Killam, Chairman; Myrna Blenkhorn, Secretary; Larry Neily, Harold Forsyth, Philip Daniels, Bryan Woodland, Jim Goit and Wanda Alexander. Dr. Rick Whitman, Dick Rogers and Dr. Robert Smith are technical advisors. Scott Acker had served as the Agriculture Canada, Plant Health representative for a number of years before being replaced by Wanda Alexander in September.

No tree removals were done in 1990 by the Apple Maggot Control Board. However, a number of older blocks were removed by the growers which included a few blocks which have been problems in the past.

The Annual Fall Survey was carried out in co-operation with the Food Production and Inspection Banch of Agriculture Canada during August and September. The survey took 5 weeks to complete with 10 inspectors, 6 inspectors were employed by the Board and 4 inspectors were employed by Agriculture Canada. During this time 1014 inspections were completed: 633 commercial blocks and 381 contacts. The infestation rate of commercial blocks was 34.6% which was slightly higher than the previous year (1989 – 32.7%). Infestation in contact orchards was 56.2previous years.

The increase in apple maggot infestation in the past two years may be an indication of the state of the apple industry. Growers have received low prices for their crops for a number of years and may be trying to reduce costs by reducing pesticide application. Also in a number of cases the apple maggot problem has slowly been increasing over a number of years and gaining a foothold in the growers' orchard without them taking control of the situation. A large number of the infestations are trace amounts in Gravensteins and earlier varieties. Trace infestations are interpreted under Plant Quarantine Regulations as not more than 1 sting per acre of orchard.

Growers had ideal conditions for controlling the apple maggot this season so we will have to work closer with them in the future. The increase from 18.7% to 34.6% in two years has caused some concern when we have the knowledge and materials available to keep this insect under control and the growers do not appear to be using it. We will be looking at new ways to keep the growers informed in the next growing season.

The orchard registration forms and official spray orders were mailed out in the spring and the end of June (for the spray orders). Our records are kept up-to-date through these mailings and the fall survey. Some of the information on tree removals by the growers is obtained from the Land Improvement Policy.

A report of the Board's activities for the year is required for the Nova Scotia Fruit Grower's Association. A copy of that report is attached as well as a breakdown of infestation by sones for the last 3 years.

3.10 APPLE MAGGOT CONTROL BOARD

The level of apple maggot infestation has risen in the past two years. The rate of infestation for 1990 was 34.6%, which is slightly higher than last year. The upper trend in 1989 and 1990 may be temporary and possibly attributed to one or all of the following factors: depressed prices in previous years; growers may have reduced their spray schedules for economic reasons; or ideal conditions for apple maggot flies in August and September.

The survey results for the past seven (7) years are listed in Table 3.2. Detailed results form 1990 can be found in Tables 3.3 and 3.4.

Table 3.2: Apple Maggot Survey Summary

SURVEY RESULTS FOR PAST SEVEN YEARS (1984 - 1990)

	1984	1985	1986	1987	1988	1989	1990
# REGISTERED GROWERS	230	216	190	190	185	182	177
# BLOCKS	710	695	655	667	663	655	633
# INFESTED BLOCKS	124	133	133	115	124	214	219
% BLOCKS INFESTED	17.5	19.1	20.3	17.2	18.7	32.7	34.6
% CONTACTS INFESTED	37.4	37.6	27.6	32.2	28.1	46.2	56.2

As in the past, The Apple Maggot Control Board and Food Production and Inspection Branch of Agriculture Canada have co-operated in carrying out the fall orchard inspections. This year a total of 10 inspectors participated in the five-week survey. During this time 1014 inspections were completed: 633 commercial blocks and 381 contacts. The susceptible varieties such as Gravenstein and early varieties were hardest hit this year. Most of the infestations were at trace levels but there were some in the moderate and heavy range, which indicated a problem in the orchard that may have been building up for a few years.

Infestations in contact orchards follow a similar pattern to the commercial blocks with the level of infestation at 56.2% this year. The number of contacts has gradually declined as each year some of the trees are removed by the Board or by the property owner.

Wild and neglected trees continue to be a problem and efforts to remove these trees need to be continued. Growers can be on the watch for wild trees on their property and make every effort to remove these trees.

Table 3.3: Apple Maggot Survey Results

1990 APPLE MAGGOT SURVEY RESULTS

ZONE	GROWERS	BLOCKS	INFESTED	PERCENT
1	13	40	15	37.5
2	38	136	53	39.0
3	89	322	103	32.0
4	30	115	40	34.8
5	7	20	8	40.0
TOTAL	177	633	219	34.6

ZONE 1 — ANNAPOLIS COUNTY
ZONE 2 — WEST KINGS
ZONE 3 — CENTRAL KINGS
ZONE 4 — EAST KINGS
ZONE 5 — HANTS COUNTY

Table 3.4: Apple Maggot Survey Results

1990 APPLE MAGGOT SURVEY RESULTS

ZONE	CONTACTS	INFESTED	PERCENT
1	20	12	60.0
2	42	28	66.7
3	175	97	55.4
4	111	55	49.5
5	33	22	66.7
TOTAL	381	214	56.2

ZONE 1 — ANNAPOLIS COUNTY
ZONE 2 — WEST KINGS
ZONE 3 — CENTRAL KINGS
ZONE 4 — EAST KINGS
ZONE 5 — HANTS COUNTY

3.11 APPLE TRIPARTITE STABILIZATION PROGRAM

A total of 143 NS apple producers were enrolled in this program as of November which was three fewer than the previous year's enrollment. The premium rate for the 1990 crop was set at $6.25 per tonne. The 1989 premium rate which was originally set at $6.25 per tonne was increased by 22 cents per tonne in December 1990 to $6.47 per tonne. The 22 cents per tonne brought the 1989 premium to the full three percent of the average aggregate market value for 1989. This extra premium was deducted from the final grower payout on the 1989 crop and was matched by both levels of government. It is projected that NS producers will register 55,000,000 kg of apples for 1990 up significantly from the 1989 volume of 37,000,000 kgs.

At the May 5th National Tripartite Apple meeting it was projected that the average return for the 1989 crop would be 20 cents per kg, which fell 3.5 cents below the support of 23.5 cents per kg. Producers were therefore issued an interim payment of 1.5 cents per kg in August. Resulting from a conference call on November 23, 1990 the committee issued an additional interim payment of 1.56 cents per kg. The final payment on the 1989 crop was not set as the signatories had to resolve the issue of including or excluding APCMA payments in determining the final market price. A December 3 conference call resulted in APCMA payments being excluded from the determination of the average return for 1989. A conference call on December 4 — the 1989 support price was adjusted upwards to $239.36 per tonne from $235.00 per tonne and the national average market price set at $199.19. This resulted in a total payment of $39.95 per tonne. After deducting the previous interim payments a final payment of $9.60 per tonne (.96 cents per kg) was left. The committee also agreed to the $0.22 per tonne in additional premiums which was deducted from the final payout which was issued in February 1991. Nova Scotia producers will have received $39.73 per tonne in stabilization payments on the 1989 crop. These payments will add an additional $1,470,000 to 1989 returns. Payments on the 1989 crop will place the program in a deficit of just over $10 million.

As Nova Scotia's representative on the Apple Stabilization Committee, I attended the committee meeting in Halifax on May 16 and took part in two conference calls. I also attended the May 15 signatories meeting which was held in Halifax. At the signatories meeting, members agreed to an amending agreement that would end on July 1, 1991. The provinces still have to negotiate and "agreed level of equity" in terms of government assistance programs. An expert committee, similar to that used for red meats, would review the assistance program and make recommendtions as to agreed ceilings for assistance. To date British Columbia has not reduced the high level of assistance that their industry receives. British Columbia will have to present a proposed plan for reducing assistance levels in order for the other provinces to sign an agreement after July 1, 1991.

3.12 EXTENSION

There were no tree fruit short courses in 1990; however, I provided lectures and workshops on various aspects of tree fruit production. I gave three lectures on the NS Tree Fruit Industry and one lecture on pruning to students at NSAC. A half day workshop was held for the High Density Orchard working group on January 19 to discuss which orchard systems best suit NS growing conditions. On the evening of February 6 I gave a two hour lecture on tree fruit production to a home garden course being held at Dalhousie University. A field lab on pruning for NSAC students was conducted at the Kentville Agricultural Centre on March 15. A one-day pruning workshop was held on March 21 in conjunction with the NSFGA Pruning Committee. The morning session was held at Doug Nichols', Morristown with 10 to 15 growers in attendance and the afternoon session was at Andrew Bishop's, Greenwich with 6 to 8 growers in attendance. A half-day workshop for 6 growers was held at Bob Barteaux's, Annapolis Co. to discuss and demonstrate tree training techniques. Dr. Raymond Granger, tree fruit researcher with Agriculture Canada, St. Jean P.Q., gave a slide presentation on the central axe and slender spindle systems at the twilight meeting.

Grower consultations were held during the months of March and April to draw up spray and fertilizer recommendations for the 1990 growing season. Whereas in previous years upwards of 40 consultations were held, only 15 were held in 1990 due to the unexpected change in the Tree Fruit Entomologist position. It is expected that a full consultative service will be provided in 1991. An additional 15 to 20 office and phone consultations were held with growers to review their 1989 soil and foliar analysis reports and make fertilizer

recommendations for 1990.

Orchard visits were made throughout the growing season with the majority of visits being made within the Annapolis Valley. One trip was made to Cape Breton to visit a producer and to view a potential orchard site. One trip was also made to Yarmouth in December to meet with two producers to discuss pruning and spray recommendations for 1991. The majority of orchard visits were related to horticultural problems such as pruning, winter kill, fruit set and thinning, disease and insect problems. More time was spent on insect related problems than in previous years due to the change in the Entomologist position.

Twenty issues of the Orchard Outlook were published during the past year. Joint meetings with Federal research staff, APM and provincial staff were held Wednesday mornings during the months of May, June and July prior to writing the Orchard Outlook. The Orchard Outlook highlights were broadcast each Thursday on AVR's Farm and Resource program.

One trip outside of the province was made at which time I attended the 33rd Annual Conference of the IDFTA with three NS apple growers. The conference was held in Penticton, BC from March 4-8 with 623 participants attending the educational sessions and 471 taking part in the day and a half of orchard tour. An additional day and a half was spent visiting orchards in the Kelowna and Vernon area following the conference. British Columbia is encouraging their growers to renew old orchard plantings with new cultivars on high density systems and the three growers that travelled with me were very interested in this renewal program. Following our return from British Columbia, I worked closely with the NSFGA Rootstock and Variety Committee in developing a high density orchard program for NS apple growers. Federal Provincial funding of $300,000 was made available for this program in December and the program will be available for 1991 and 1992 orchard plantings. The program will assist producers with the establishment of 1 to 2 acres of high density orchards which have tree densities of 300 to 600 trees per acre. The aim of the program is to allow producers the opportunity to manage high density orchards.

Services provided to fruit growers during the past year were:

1. Orchard site evaluation — two orchard sites were evaluted as to their suitability for fruit trees with the assistance of Dr. Webster.

2. Soil fumigator — 7 apple growers used the soil fumigator during the fall months to fumigate 4.5 ha of old orchard land.

3. Soil and foliage analysis — 82 growers requested this service with 499 leaf and 485 soil samples being collected between July 30 and August 17. This compares to 1989 figures of 72 growers and 395 samples.

During the past year I assisted two apple growers in applying for AFDA funding under the Technology Introduction and Evaluation Program:

1. Evaluation of Scab Resistant Cultivars on Bud. 490 Rootstock

2. Evaluation of an Air Curtain Orchard Sprayer.

I served as the project leader on these two trials. I also made joint submissions with the NSFGA to the Human Resource Program — an investigative travel to British Columbia for apple producers was turned down while funding for three guest speakers at the NSFGA Annual Meeting was provided under this program. I was also a collaborator on a Technology Development Project — Improve fruit quality and annual bearing in apple orchards, which was submitted by the NSFGA and Charlie Embree. I served as project leader on three additional AFDA projects:

1. Electronic Pruning Shears - Robert Barteaux,

2. Commercial Evaluation of New Apple Cultivars - Gilbert Allen,

3. Apple Rootstock, Cultivar and Training System Evaluation - Peter VanOostrum.

Table 3.5: 1990 NS Tree Fruit Crop Estimates

	1989 Bushels	1990 Bushels	% Change From 1989
Apples	2,700,000	3,300,000	+22
Gravenstein	200,000	250,000	+25
McIntosh	950,000	1,200,000	+26
Cortland	300,000	450,000	+33
Red Delicious	220,000	230,000	+ 5
Spy	270,000	290,000	+ 7
Spartan	50,000	50,000	0
Idared	60,000	80,000	+33
Others	650,000	750,000	+15
Pears	50,000	50,000	0
Plums	6,500	3,500	-46

Table 3.6: Final Disposition of 1989 Tree Fruit Crops

	Bushels	Farm Gate Value
Production	2,700,000	$8,610,000
Fresh Fruit Sales		
Domestic - Certified	153,967	
Domestic - Uncertified	738,037	
Exported	75,426	
Total	967,430	$5,646,500
Processed	1,732,570	$2,963,500
Pears	50,000 ($9.90)	$ 495,000
Plums	6,500 ($17.96)	$ 116,740

I served on the following NSFGA Committees - Rootstock, Variety, Research and Development, Maturity and Storage, Pruning, Summer Orchard Tour, and Annual Meeting. I also served on the Provincial Farm Weather Service Committee, the Nova Scotia Tree Fruit Research Foundation and the National Tripartite Stabilization Committee for Apples. I continued to serve as editor for horticultural publications put out by the Atlantic Advisory Committee on Tree Fruits.

Chapter 4

BERRY CROPS — EXCLUSIVE OF LOWBUSH BLUEBERRY

By Robert A. Murray, Senior Horticulturist
Andrew King, Technician
John Arnold, Technician

4.1 OVERVIEW

The 1990 berry crop grossed Nova Scotia growers $6,218,685. (Table 4.1) This is a decrease of $294,330 over 1989 farm value. Lower production in strawberry and highbush blueberry fruit, and lower farm gate strawberry price contributed to the decrease. Higher production occurred in certified strawberry plant sales and grape production. A new farm winery was opened in 1990. Many new berry crop projects were initiated in 1990 and several were completed.

Table 4.1: Berry Crop Production And Value — 1990

FRUIT	PRODUCTION	UNITS	PRICE	VALUE ($)
Strawberry	3,800,000	quarts	0.919	3,492,000
Highbush Blueberry	263,000	pints	1.40	368,000
Cranberry	450,000	pounds	0.70	315,000
Raspberry	160,000	pints	1.30	208,000
Grape	160	tonne	600.00	96,000
Strawberry Nursery Plants	25,632,590	plants	0.064	1,640,485
Raspberry Nursery Canes	300,000	canes	0.33	99,000
TOTAL				6,218,685

4.2 STRAWBERRY

The Nova Scotia strawberry industry in 1990 recorded a farm gate value of 5.13 million dollars, down $283,530 from 1989. (Table 4.2) Fruit production was down about 200,000 quarts; plant production was up by 2 million plants. (Table 4.3)

Table 4.2: Total $ Value — Nova Scotia Strawberry Industry

YEAR	$,000 FRUIT SALES	$ PLANT SALES	$ TOTAL
1980	1,827	302,104	2,129,104
1981	1,988	455,666	2,443,666
1982	3,160	520,768	3,680,768
1983	3,397	831,534	4,228,534
1984	3,720	931,222	4,651,222
1985	3,520	871,058	4,391,058
1986	3,419	912,934	4,332,434
1987	3,867	1,175,259	5,042,759
1988	4,376	1,306,195	5,682,195
1989	4,000	1,416,015	5,416,015
1990	3,492	1,640,485	5,132,485

4.2.1 Fruit Production

Nova Scotia's strawberry crop is estimated at 3.8 million quarts, down slightly from the 4 million quarts harvested in 1989. (Table 4.6) Harvested acreage of 700 acres has been holding steady for the past two years.

Crop yields varied greatly. A few growers reported complete winter kill in some fields, a few growers had reduced yields, while other growers reported excellent yields.

In contrast to 1989, the 1990 harvest season was 10 days later than last year because of a cold wet May.

Nova Scotia strawberry growers planted 338 acres in 1989, and 359 acres in 1990. With a carry over of third year fields planted in 1988, an estimated 750 acres may be in production for 1991. (Table 4.5)

4.2.2 Fruit Marketing

A localized temporary marketing situation caused a stir on the market during the period July 6-13 which created a sharp price drop, causing an unnecessary monetary loss to some growers. (Table 4.8) As the season ended, Nova Scotia did not have an oversupply on the market. For a number of years the Strawberry Growers' Association of Nova Scotia attempted to develop an organized fresh fruit marketing system. They are presently developing a strawberry marketing strategy.

The fresh wholesale market experienced a 7.5% drop in supply from 54.6% to 47.1%. (Table 4.7) The Pick-Your-Own, export to other provinces, and processing, all experienced a slight percentage increase.

The weighted average farm gate return of $0.919 was $0.081 cents per quart less in 1990 than in 1989. (Table 4.9) This drop in price meant a loss of $307,800 to the growers.

4.2.3 Strawberry Nursery Plant Production and Marketing

Nova Scotia's certified strawberry plant nursery program continues to expand with new record sales of 25.6 million plants from five nurseries. (Table 4.3) Over 93 percent of the plant sales were exported out of Nova Scotia. (Table 4.4) A new strawberry nursery was certified in 1990. This nursery operated by Joe Cooper, Great Village, Colchester County, is producing certified plants of the southern varieties for the Florida market.

As part of the plant certification program, a total of five field inspections for Northern plants and three field inspections for Southern plants per nursery are made by a plant pathologist, entomologist, horticulturist and two to three technicians. Inspections are made in the packing house during fall and spring cleaning of

Table 4.3: Nova Scotia Strawberry Nursery Sales

YEAR	TO NOVA SCOTIA GROWERS (PLANTS)	ACRE EQUIVALENT	TO GROWERS OUTSIDE PROVINCE (PLANTS)	TOTAL PLANTS	$ FARM VALUE
1980	2,226,050	506	4,201,700	6,427,750	308,534
1981	2,529,525	575	6,583,800	9,113,325	455,666
1982	2,188,880	497	7,637,950	9,826,830	520,882
1983	2,357,575	536	13,331,750	15,689,325	831,534
1984	2,770,025	629	13,285,835	16,055,560	931,222
1985	2,170,775	493	13,110,950	15,281,725	871,058
1986	2,754,400	626	12,985,850	15,740,250	912,934
1987	2,057,150	467	18,205,950	20,263,100	1,175,259
1988	1,501,180	341	21,019,425	22,520,605	1,306,195
1989	1,491,400	339	22,108,850	23,600,250	1,416,015
1990	1,581,975	359	24,050,615	25,632,590	1,640,485

Table 4.4: Nova Scotia Strawberry Nursery Sales by Per Cent

	1989	%	1990	%
Nova Scotia	1,491,400	6.3	1,581,975	6.2
Out of Province	22,108,850	93.7	24,050,615	93.8
Total	23,600,250	100	25,632,590	100

Table 4.5: Acreage — Nova Scotia Summary

YEAR	ACRES PLANTED	FIRST YEAR PRODUCING	CARRY-OVER FIELDS	TOTAL ACRES HARVESTED
1970	308	323	98	421
1971	304	308	91	399
1972	309	304	75	379
1973	324	309	73	382
1974	285	324	75	399
1975	366	285	100	385
1976	397	366	160	526
1977	394	397	200	597
1978	418	394	200	594
1979	486	418	209	627
1980	506	486	244	730
1981	575	506	452	958
1982	497	474	503	1078
1983	536	497	548	1045
1984	629	536	564	1100
1985	493	629	521	1150
1986	623	493	507	1000
1987	467	600	500	1100
1988	341	460	540	1000
1989	339	341	309	650
1990	359	339	361	700
1991	–	359	391	750

Table 4.6: Market Distribution of Nova Scotia Strawberries (000's quarts)

YEAR	NOVA SCOTIA FRESH SALES *	OTHER PROVINCES FRESH SALES	EXPORT	PROCESSING	TOTAL
1990	3,309.0	343.5	**	**	3,800
1989	3,583.0	304.5	**	112.5	4,000
1988	3,742.0	300.5	**	457.8	4,500
1987	2,962.0	261.0	–	277.2	3,500
1986	2,843.0	378.0	–	297.0	3,500
1985	4,435.8	271.2	42.0	251.0	5,000
1984	4,154.4	342.0	–	500.0	5,000
1983	3,687.0	180.0	–	433.0	4,300
1982	3,627.0	138.3	–	234.7	4,000

* Includes wholesale and Pick-Your-Own Sales

** Confidential, included in totals

Table 4.7: Percent Distribution of Strawberry Marketing, Nova Scotia

YEAR	PICK-YOUR-OWN	WHOLESALE	OTHER PROVINCES AND EXPORT, FRESH	PROCESSING
1990	40.0	47.1	9.0	3.9
1989	35.0	54.6	7.6	2.8
1988	30.0	53.1	6.7	10.2
1987	35.0	49.6	7.5	7.9
1986	30.0	50.7	10.8	8.5
1985	35.0	53.7	6.3	5.0
1984	40.0	43.1	6.9	10.0
1983	55.0	30.8	4.2	10.0
1982	68.7	22.0	3.4	5.9

Table 4.8: 1990 Strawberry Unloads, Halifax

DATE (1990)	QUARTS	AVERAGE W/S PRICE	AVERAGE FARM GATE PRICE *
June 27	4,944	2.02	1.77
June 28	2,760	2.02	1.77
June 29	5,580	1.98	1.73
July 3	8,316	1.78	1.53
July 4	11,444	1.68	1.43
July 5	16,200	1.68	1.43
July 6	24,840	1.40	1.15
July 7	6,456	–	–
July 8	6,000	–	–
July 9	18,258	1.30	1.05
July 10	23,944	1.25	1.00
July 11	5,160	1.15	.90
July 12	12,100	1.15	.90
July 13	6,200	1.15	.90
July 16	4,860	1.30	1.05
July 17	3,900	1.30	1.05
July 18	4,700	1.30	1.05
July 19	5,120	1.30	1.05
July 20	2,000	1.30	1.05

Total Unloads 172,782 quarts

* Wholesale Selling Less $.25/quart commission and freight =farm gate price

Table 4.9: Nova Scotia Strawberries 1990

WHOLESALE/RETAIL		
2,130,000 quarts @ $.98/quart*	=	$2,087,400
PICK-YOUR-OWN		
1,520,000 quarts @ $.88/quart	=	$1,337,600
EXPORTS AND PROCESSED		$ 66,690
TOTAL VALUE, FARMGATE		$3,491,690
* Wt. average farm gate price		$1.18/quart
less containers		-.20
farm gate price, fruit only		$0.98/quart

Weighted average farm gate return:0.919/quart

the plants. In the fall, a root bait test is conducted by a plant pathologist. During the winter season, a technician checks the storage room temperature on a monthly basis.

All five nurseries were certified for the 1990-1991 season. A total of 131 acres were inspected.

The Nova Scotia certified strawberry plant nurseries have been a great growth industry. Its success lies in the excellence of the management and culture of the plants; the cleaning, packing, storage and shipment of the plants; the development of markets; and the necessary grower follow-up to the markets, and invitations to their buyers to visit the Nova Scotia nurseries.

The production of strawberry nursery plants does have limitations. The greatest limitation is to have sufficient labour to clean the plants during the fall harvest.

The three certified nurseries that propagate Northern plants report they probably have the largest inventory ever in storage.

Presently, Nova Scotia Northern plants are sold in every province in Canada, from Newfoundland to the interior of British Columbia, and to twelve or more states in the United States. However, there are many nurseries in the United States, Ontario and Quebec selling northern cultivars.

A new six-minute strawberry nursery video, explaining the Nova Scotia Certified Strawberry Nursery Program was produced by Chroma Communications, Inc., Truro, for the Strawberry Growers' Association of Nova Scotia. This video included virus indexing of strawberry plants, nuclear and elite plant propagation in screenhouses, soil fumigation, field planting, use of plastics in the field to increase plant growth, cultivation, application of pesticides, irrigation, field inspection for plant certification, harvesting, cleaning and cold storage of plants. This video was funded by Canada/Nova Scotia Agri-Food Development Agreement, and part of the Strawberry Plant Marketing Information Project. The video will be shown in the strawberry nursery booth when it is displayed at local, Canadian and United States strawberry meetings and trade shows. The strawberry nurserymen will use the video when they visit their clients, or when their clients visit the nurseries.

In 1990, the strawberry nursery booth was set up at the following events:

January 10-11, 1990	Nova Scotia Department of Agriculture and Marketing Staff Conference, Truro, Nova Scotia
January 23-24, 1990	Strawberry Growers' Association of Nova Scotia Annual Meeting, Truro, Nova Scotia
February 11-14, 1990	North American Strawberry Growers' Convention Houston, Texas, U.S.A.
December 7-8, 1990	Nova Scotia Federation of Agriculture Annual Meeting, Truro, Nova Scotia

4.2.4 Major Strawberry Meetings

Strawberry Growers' Association of Nova Scotia

The Annual Meeting of the Strawberry Growers' Association of Nova Scotia was held January 23-24, 1990, Truro, Nova Scotia. The theme for the convention was *Strawberry Integrated Pest Management.* A seminar *Pesticides and the Consumer* highlighted the theme. Theme speakers included:

1. Dr. Peter Saschenbrecker, Associate Director, Product Assessment and Analysis, Agri-Food Safety Division, Agriculture Canada, Ottawa. Presentation: *Pesticide Residue*
2. Diane Walmsley, Pesticide/Plant Products Office, Agricultural Inspection Directorate, Kentville. Presentation: *Pesticide Registration and Safety*
3. Sharon Chard, Chief of Inspection, Health and Welfare Canada, Health Protection Branch, Halifax. Presentation: *Pesticide Monitoring*
4. Dr. Charles Vincent, Entomologist, Agriculture Canada, Research Station, St. Jean-sur-Richelieu, P.Q. Presentation: *IPM Strawberries*
5. Susan Sutherland, R.P.DI., National Director of Promotions, Fresh for Flavour Foundation, Ottawa. Presentation: *Restoring Consumer Confidence in the Fact That Fruit is Safe to Eat*
6. Joe Huber, operator of Family Farm, Orchard and Restaurant, Borden, Indiana. Presentation: *Pesticides - The U.S. Perspective*

A Strawberry IPM AFDA project for the next four years resulted from this seminar.

Eight SGANS director and committee meetings were attended during 1990.

North American Strawberry Growers' Association

The Annual Meeting of the North American Strawberry Growers' Association was held February 11-14, 1990, Houston, Texas. There were over 300 strawberry growers, industry, university and government representatives at this meeting. Every province in Canada with the exception of Prince Edward Island was represented. There were nine delegates from Nova Scotia. The Strawberry Growers' Association of Nova Scotia sponsored a booth at the trade show explaining the Nova Scotia Certified Strawberry Plant Nursery Program.

The program was very broad ... from numerous aspects of production to marketing with some key sessions on motivation (yourself/your employees/your customers).

In keeping with the theme of many commodity groups in 1990 (including the Strawberry Growers' Association of Nova Scotia) one key session was *Food and Worker Safety and the Changing Patterns of Pesticide Use.*

There were program speakers from Italy, England, Canada and the United States.

3rd North American Strawberry Conference

The 3rd North American Strawberry Conference was held February 14-16, 1990, Houston, Texas. The 1st North American Strawberry Conference was held at Rutgers University in 1963. The 2nd North American Strawberry Conference was held at St. Louis, Missouri, February 1980.

There were 166 delegates (scientists and growers) from all over the world at this conference. Countries represented included United States, Canada, Japan, England, Finland, Poland, Italy, France, Spain and Israel. There were six delegates from Nova Scotia. The conference was North American; however, the topics were international. Included in the formal presentations were *The Strawberry in Europe* by Dr. Pasquali Rosati, University of Bologna, Italy; *The Strawberry in Japan* by Dr. Yasabor Oda, University of Osaka

Prefectore, Japan; *Red Stele in North America* paper prepared by Dr. Nancy Nickerson, Agriculture Canada, Kentville and delivered by Dr. John Maas, U.S.D.A., Beltsville, Maryland.

There were 39 poster presentations from eight countries. The poster presentation *Development of the Bragg Strawberry Harvester* by Peter Swinkels and Robert Murray, Nova Scotia Department of Agriculture and Marketing was one of eight poster presentations from Canada.

This 3rd conference was one of the rare opportunities to meet world famous strawberry plant breeders. Strawberry plant breeders honoured at this conference were Dr. Royce Bringhurst, University of California, Davis, California and Dr. Gene Galletta, U.S.D.A., Beltsville, Maryland.

4.2.5 Strawberry Projects

1. Pesticides and the Consumer: A Seminar in Proper Usage and Public Relations. Applicant: SGANS-AFDA (HRD-99); presented January 23-24, 1990-AGM -SGANS.

2. Strawberry IPM. Applicant: SGANS-AFDA (TIP 136); a four year program initiated May 1990.

3. Certified Strawberry Plant Marketing Information. Applicant: SGANS-AFDA (MD-045 B); program from 1988-1991.

4. Strawberry Fruit Promotion. SGANS-NSDAM-1990.

5. Marketing and Motivation Seminar. Applicant: SGANS-AFDA(HRD-177); program planning 1990 to be delivered January 24, 1991.

6. Development of A Mechanical Strawberry Harvester, AFDA(TDP-32). Applicant: Doug Bragg Enterprises, Collingwood, Cumberland County; project term 1988-1990.

7. Colour Sorting of Mechanically Harvested Strawberries AFDA (TIP-135). Applicant: Rainbow Farms, Upper Rawdon, Hants County; project term 1990-1991.

8. Commercial Testing of Dayneutral Strawberries AFDA (TIP-63). Applicant: Terry Wenham, Bass River, Colchester County; project from 1989-1990. Completed project printed in Plant Industry Project Report-Horticulture, 1990.

9. Intensified Cropping of Strawberry AFDA (TIP-043). Applicant: Telder Berry Farms, Enfield Road, Hants County; project term 1989-1990.

10. Operation Spray Check. Leader: Lise LeBlanc, Plant Industry, Nova Scotia Department of Agriculture and Marketing. A number of strawberry growers participated in this project.

4.2.6 Education

1. Five strawberry newsletters and numerous fact sheets were prepared.

2. A Maritime strawberry growers tour to Prince Edward Island was held September 21-23, 1990. There were approximately ninety to one hundred on the tour with twenty-five from Nova Scotia.

4.2.7 Strawberry Crop Insurance

A strawberry crop insurance program, administrated by the Nova Scotia Crop and Livestock Insurance Commission, has been in operation for seventeen years. In the 1990 growing season 15 growers had 70 acres insured, which was 10% of the production acreage. Two claims were filed for a total of $2,900. (Table 4.10)

Table 4.10: Strawberry Crop Insurance

FISCAL YEAR	CONTRACTS	INSURED	ACRES	CLAIMS	CLAIMS PAID
1974	37	37	154	16	$19,224.47
1975	30	30	99	6	2,345.13
1976	28	28	117	8	6,799.00
1977	28	27	99	6	3,775.30
1978	21	18	78.5	1	3,659.00
1979	18	18	64	6	4,797.80
1980	22	22	90	2	11,015.90
1981	22	22	96.4	8	18,585.00
1982	23	23	109	2	3,212.00
1983	22	22	116	4	5,314.00
1984	20	20	97	3	1,800.33
1985	23	23	185	1	1,626.00
1986	23	23	101	9	26,705.75
1987	15	15	63	1	179.60
1988	18	18	67	0	0.00
1989	15	15	71	0	0.00
1990	15	15	70	2	2,900.00

4.3 GRAPES

Nova Scotia has 41 grape growers in seven counties with 150 acres under management. In 1990, 10.49 new acres were planted, 18.16 acres removed or abandoned resulting in 150 potential acres for grape production. The reduction in vineyard acreage in 1990 was the result of vineyard restructuring and removal of undesirable cultivars.

Grape production in 1990 was estimated at 160 tonnes.

The grape vines came through the 1989-1990 winter with very little winter injury. The cool weather during May did cause growers to wonder what affect it may have on grape maturity. As it turned out, weather wise, heat units during the growing season were above normal. Degree days above 10°C either equalled or exceeded the 1989 record high. The thirty year normal was 909. Data from five stations in 1989 was 1011, while in 1990 there were 1038 degree days over 10°C. This resulted in excellent grape maturity, and for most part high brix and reasonable acid levels. For the first time in ten years one vineyard did experience a lack of moisture because of a period of dry weather during the latter part of the growing season.

4.3.1 Educational Activities 1990

1. Grape Seminar, March 30, Agricultural Centre, Kentville. Topics covered included vineyard nutrition, canopy management, wind shelters, soil resources and management, and spray management.

2. Vineyard Consultations. Throughout the spring, summer and fall, Lloyd Schmidt, Consulting Viticulturist, visited many vineyards by advance appointments.

3. North Shore Grape Tour - August 30

4. Valley Fall Grape Tour - September 27

5. Grape Newletters - five editions.

6. Weather Data. Weather data is collected from both the automatic weather stations and manual stations and information is provided to growers through the media of newsletters and grower meetings.

At present automatic and manual stations are established at seven vineyards. The automatic weather stations are giving continuous malfunction problems. It is planned to phase these out in favor of manual stations. Ten new manual weather stations will be established in 1991, five of these will be at new vineyard locations. When all the stations are in place weather data will be recorded from 12 vineyards in five counties.

4.3.2 Grape Projects

1. *Grape Rootstock and Scion Evaluation*-AFDA-TDP 39. Applicant: GGANS In June 1989 a total of 3350 grafted vines consisting of ten cultivars on seven rootstocks were planted in a nursery plot at Habitant Vineyards, Habitant, Kings County for two years. On November 10, 1990, the vines were removed from the nursery, graded, and placed in cold storage. A total of 1217 vines will be planted at four sites in the spring of 1991.

   Full introduction report contained in Grape Newsletter Number 2, June 1990.

2. *Grape Trellising and Canopy Management*-AFDA-TDP 37. Applicant: GGANS During the spring of 1990 various trellis designs were installed on four vineyards in Nova Scotia. The site locations include:

   (a) MacLelland Vineyards, North Grand Pre, Kings County

   (b) Habitant Vineyards, Habitant, Kings County

   (c) Jim Gray, South Berwick, Kings County

   (d) Saint Famille Vineyard, Upper Falmouth, Hants County

   In 1991 these plots will be monitored measuring four items:

   (a) plant maturity

   (b) vine productivity

   (c) disease occurrence

   (d) fruit quality

   Starting in 1990 spring and fall growth was recorded at each site on video. Detailed project introduction printed in Grape Newsletter Number 2, June 1990.

3. *Database of Vineyard Profiles*-AFDA-TDP 79. Applicant: GGANS This project is to gather information on the impact of nutrient levels and soil conditions on vine growth and fruit quality.

   During 1990 site inspections and soil tests were made at seven vineyards. The purpose of the preliminary sampling is to study the distribution of the experimental parameters so that an optimal design can be chosen. The Federal Soil Survey Unit, Agriculture Canada, Truro; Mike Langman, Provincial Advisor, Plant Industry Branch, Truro; and Lloyd Schmidt, Consulting Viticulturist conducted the site inspections.

   Detail project introduction printed in Grape Newsletter Number 2, June 1990.

4. *Climatic Evaluation of Nova Scotia Vineyards*-AFDA TIP-137. Applicant: Robert Gordon, NSDAM Project initiated 1990 with 10 manual stations to be installed in 1991. The objective of this proposed study is to collect and evaluate farm level climate information on a permanent basis at a number of established vineyards throughout Nova Scotia. This project will be of significant benefit to projects 1, 2, and 3 listed above.

5. *Viticulture Leaf Cutter*-AFDA-TIP 141. Applicant: Jost Vineyards Ltd., Malagash, Cumberland County Completed report printed in Plant Industry Branch, Horticultural Crops Section Project Reports, 1990.

6. *European Floating Arm Weeder*-AFDA TIP 105. Applicant: MacLelland Vineyards, North Grand Pre, Kings County. Project initiated in 1990 with modifications to the weeder. Project to be evaluated in 1991.

7. *Establishment of Austrees for Windbreaks* Location: Ocean Brink Enterprises, Melville, Pictou County. A planting of 500 Austrees in five locations in a 10 acre vineyard in spring of 1990. Observations to be made over a five year period.

4.3.3 Nova Scotia Farm Wineries

The opening of Sainte Famille Wines, Upper Falmouth, Hants County, in June 1990, is another positive growth factor in Nova Scotia's developing grape industry. Nova Scotia has three farm wineries. The development of estate farm wineries is part of the mandate of the Grape Growers' Association of Nova Scotia to produce and market quality wine products utilising production from their vineyards.

Jost Vineyards, Malagash, won a silver and five bronze awards for six of their wines at the 1990 Atlanta Internation Wine Competition in Atlanta, Georgia.

Grand Pre Estates, Grand Pre, in a press release, plan to introduce a number of new wines in 1991.

4.3.4 Grape Growers' Association of Nova Scotia

The Annual Meeting of the Grape Growers Association of Nova Scotia was held at Kentville, January 10, 1990.

Several director and research committee meetings were attended during 1990.

4.3.5 1990 Grape Survey Report

The 1990 Grape Survey Report was completed. Several new vineyards were measured, as well as older vineyards remeasured because of vineyard restructuring. Some vineyards or sections were decertified.

This report identifies a number of growers and acreage by county, lists growers by county, a summary of yield from 1981-1990 and identifies the three farm wineries.

4.4 RASPBERRY-BLACKBERRY

The 1990 raspberry crop is estimated at 160,000 pints, lower than the potential from new plantings. Many growers reported varying degrees of winter injury. Additional new acreage has been planted in 1990.

U-Pick price ranges from $0.90 to $1.10 per pint; fresh market returns from $1.50 to $1.75 per pint.

There is new interest in developing blackberry plantings. One grower has a three acre planting and several growers have less than one acre.

There is renewed interest from raspberry and blackberry growers to establish a Bramble Growers' Association of Nova Scotia. This interest is spearheaded from the present Raspberry Growers' Association of Nova Scotia.

The Raspberry Growers' Association of Nova Scotia held their Annual Meeting and seminar on February 21, 1990, at Greenwich, Kings County. They held a combination meeting and Field Tour at the Kentville Research Station on July 26th. On November 24, at a special meeting the Raspberry Growers' Association of Nova Scotia changed their name to the Bramble Growers Association of Nova Scotia. This name change will include raspberry and blackberry growers. Their larger counterpart organisation is the North American Bramble Growers Association whose membership includes United States and Canadian growers. The NABGA meetings and seminars have been held in the United States.

4.5 HIGHBUSH BLUEBERRY

The 1990 highbush blueberry crop is estimated at 263,000 pints, down 27,000 pintes from 1989 and still well below the potential and former average production of 430,000 pints. The expected cause for the low yields

is some form of winter injury to the fruit buds.

U-Pick price $0.85 per pint; local fresh $1.33; export $2.30. The wholesale Boston price was lower than average at the beginning of the season because additional Michigan highbush blueberries were diverted from processing to the fresh market.

Indicators point to lower prices for fresh fruit on the Boston market for 1991 because of increased volume from new planting and larger volume in storage. The only bright spot would be for really late fresh berries.

A crop insurance plan was developed for highbush blueberries for the 1990 season. The highbush blueberry growers did not accept the plan as they claimed their share of the cost was not acceptable.

The Highbush Blueberry Growers' Association Annual Meeting and Seminar was held at Greenwich, Kings County, March 6, 1990.

4.6 CRANBERRY

The 1990 cranberry crop is estimated at 450,000 pounds, similiar to the crops of the past four years. The Halifax wholesale paying price is $18.00 to $21.00 (24x12oz.) unchanged for the past few years.

Requests were received from potential cranberry growers in Yarmouth, Arichat and West Apple River to inspect sites to either develop new cranberry bogs or to redevelop abandoned bogs.

4.6.1 Project

1. Cranberry Nutrition Trial Applicant: Dew Drop Garden (Jim Keiser), Grants Cove, Halifax County

   A trial using superphosphate and agricultural limestone was established on the Keiser cranberry bog, May 24, 1990, to determine if a treatment may overcome a natural high zinc level which may cause a fruit abortion problem. Yields were recorded, October 4, 1990. Two years of data will be collected before a report will be prepared.

4.7 OTHER MEETINGS, COMMITTEES, EVENTS*

- NSDAM Staff Conference, Truro, January 11
- Workshop on the Application of Climate and Weather Information to the Farm, Truro, January 25
- Horticulture and Biology Services Last Branch Meeting, Halifax, January 26
- Plant Industry, Branch Meeting, Truro, February 23; Tour, Kings County, September 26; Open House, Truro, November 2
- NSDAM Safety Committee Meetings, Truro, January 29, June 28, September 12, October 10, November 29
- Farm Health and Safety Committee Meetings, Truro, March 8, June 5
- Swing Into Spring, WTCC, Halifax, February 24
- EMO "React 90", Debert, April 24, May 9, May 17; Halifax, October 23
- Amherst Rotary Club regarding strawberry industry, Amherst, June 18
- Expo '90, Sheffield Mills, July 18
- Food Fair, Keddy's Motor Inn, Truro, September 8
- Atlantic Winter Fair, Halifax, October 12

- Low Pesticide Use in Berry Crops, Kentville, October 18
- Elderhostel—"Nova Scotia Grape Industry", Wolfville, October 21
- APASCC Berry Crops, Memramcook, New Brunswick, November 7-9
- Saanichton Plant Quarantine Station Program Review and Annual Meeting, Vineland Station, Ontario, November 21-22. Complete report on file.
- HRIO—Berry Crop Tour, Vineland Station, Ontario, November 23
- Lecture to Degree and Technician, NSAC, Truro, November 30
- Nova Scotia Federation of Agriculture Annual Meeting, Truro, December 7

* Not referred to in Annual Report

4.8 FARM POND PROGRAM

The Farm Pond Program continues to be a very important asset for growers of high value horticultural crops who depend on irrigation for supplementary water and farmers who depend on farm ponds for livestock watering.

The Farm Pond Program is administered by the Plant Industry Branch, with farm pond recommendations and site inspections by staff of the Agricultural Engineering Section, Extension Services.

In 1990, 46 farm pond applications were received. Forty two (42) applications were approved for $141,170; twenty-six farm ponds were either constructed or enlarged in nine counties for $70,386.38 in funding.

Table 4.11: Farm Pond Program

FISCAL YEAR	APPLICATIONS APPROVED AND COMPLETED	COUNTIES	ASSISTANCE
1983-84	18	8	$39,556.94
1984-85	19	5	48,291.00
1985-86	16	5	61,474.64
1986-87	23	5	64,695.56
1987-88	21	7	52,356.92
1988-89	20	10	33,498.28
1989-90	15	7	35,043.96
1990-91	26	9	*70,386.38

* estimate to date
46 applications received
42 applications approved for $141,170 funding
16 applications cancelled
26 ponds completed for financing

4.9 ACKNOWLEDGEMENTS

The Berry Crop Program receives support from many co-operators within the Nova Scotia Department of Agriculture and Marketing, Agriculture Canada, other Provincial and Federal Agencies. Farm organisations and private industry works closely with the Berry Crop program.

Special appreciation is extended to technicians Andrew King, John Arnold, Kim Best and to stenographers Beth Hingley and Janet MacGregor.

Chapter 5

LOWBUSH BLUEBERRY

By Jack Sibley, Horticulturist
Dale McIsaac, Horticulturist
Andrew King, Technician

5.1 OVERVIEW

The official figure for Nova Scotia's 1990 lowbush blueberry crop is 27,994,286 pounds (12,597,428 kgs). The previous five-year average figure (1985 to 1989) is 17,504,956 pounds (7,877,230 kgs) and the previous crop record, in 1988, was 22,005,048 pounds (9,902,271 kgs). Distribution of the 1990 crop was as follows:

Table 5.1: Distribution of 1990 Lowbush Blueberry Crop

	lbs (kgs)	% of Total
Processed in Nova Scotia	19,604,975 lbs (8,822,238 kgs)	70.0 %
Exported for Processing to U.S.	6,830,537 lbs (3,073,741 kgs)	24.4 %
Exported to Other Cdn Provinces for Processing	1,105,101 lbs (497,295 kgs)	4.0 %
Fresh Fruit Sales in Nova Scotia	453,673 lbs (204,152 kgs)	1.6 %
TOTAL	27,994,286 lbs (12,597,428 kgs)	100.0 %

The 1990 growing season was close to ideal with adequate moisture in most areas except for a two-week period in early July and another one-week peiod in early August. Blight infections were the lowest in years and there were no serious insect outbreaks. Pollinating weather during the bloom period was good. Native pollinators were abundant but there were problems with both the quantity and quality of honeybee colonies available for pollination. Some large fields in Cumberland County experienced yield problems due to failure of fruit to size and ripen properly. The exact cause of this problem has not been established but it is being blamed on insufficient pollinators and/or possible unfavorable weather conditions during some stage of the bloom period.

Weather was generally good during the harvest season with very little rain to interfere with the harvest. Processors initiated an industry wide harvest scheduling program this year for the first time. Growers were given a schedule indicating which days the receiving sheds and processing plants would be accepting fruit. Although there was a considerable amount of initial apprehension among growers, the system worked quite

smoothly. The plan helped greatly to even out the flow of berries to the processing plants and dramatically increased the pecentage of Grade A product that was packed.

Growers received 40 cents per pound for their crop. The previous five-year average price is 53 cents per pound. The total farm gate value of the 1990 crop, at 40 cents per pound, is $11,197,714.

5.2 INDUSTRY TRENDS

Growers have moved rapidly to the use of flail mowers for pruning and mechanical harvesters for harvesting. The use of these two machines cuts production costs dramatically and eliminates much of the seasonal pressure on both pruning and harvesting operations. Because of these advantages, interest in levelling blueberry land and removing stumps and rocks has reached a feaver pitch throughout the industry. Bulldozers, discs, excavators and rollers are being used to level acreage and various combinations of existing and new specialised machinery are being adapted for use in stump and rock removal. Several research studies have been initiated to assess these new techniques and evaluate their impact on production.

Research in weed control is concentrating on chemicals and methods to deal with escape weeds which survive and prosper following Velpar treatments.

An insect survey has been carried out in Nova Scotia fields for the past several years and has been very effective in pinpointing and controlling potential outbreaks before they become serious. There is a notable trend toward increased insect problems in fields which have been pruned be mowing for several cropping cycles.

Production technology is advancing rapidly in the industry and growers continue to become more sophisticated in their use of new machinery and methods as new technology emerges.

5.3 PRINCIPAL EXTENSION ACTIVITIES AND PROJECTS

5.3.1 Winter Information Meetings

In cooperation with the Blueberry Producers' Association of Nova Scotia and the Agricultural Representatives in the various blueberry producing areas of the province, a series of winter extension information meetings were held as follows:

Table 5.2: Winter Extension Information Meetings 1990

DATE	LOCATION	GROWER ATTENDANCE
January 31	Parrsboro	48
February 7	Westchester	34
February 12	Bass River	38
February 15	Dean	25
February 19	Bridgewater	13
February 22	Gore	15
February 26	Blue Mountain	46
March 1	Goshen	20
March 14	Yarmouth	15
		254

5.3.2 Production and Marketing Short Course

A one-week short course on Lowbush Blueberry production and marketing was held January 8-12 at the Nova Scotia Agricultural College. The course was part of the on-going Vocational and Continuing Education program of the College. Twenty-six people attended (14 from Nova Scotia, 6 from Newfoundland and 6 from New Brunswick).

5.3.3 Participation in Maine Short Course

A short course for Maine blueberry producers was held at Augusta, Maine, January 18 and 19. Our Department participated in several sessions of this course, discussing land improvement technology developed in Nova Scotia.

5.3.4 Consultation Service for Newfoundland Blueberry Industry

Two days were spent in Newfoundland assessing the potential for use of land improvement technology which has developed in Nova Scotia over the past several years.

5.3.5 Attendance at Annual Meetings

The annual meetings of the Wild Blueberry Association of North America (WBANA) and the North American Blueberry Research and Extension Workers were held at Moncton, New Brunswick, March 28 and 29. Attendance at these meetings provided an excellent opportunity for an exchange of information and consultation on extension and research activities.

5.3.6 Spring Field Day Meetings

A series of field meetings were held in June to discuss and explain, in a field setting, insect and disease problems with growers. These sessions provided an excellent forum for educating growers on insect and disease identification and control. Seven of these mini field days were held this year. Plans are to expand this program in 1991.

5.3.7 Cooperative Activities with Growers' Association

A number of projects and activities to promote the growth and development of the blueberry industry were undertaken in close association with the Blueberry Producers' Association of Nova Scotia. Some of these included:

- The annual field day and tour held in Pictou County, August 4.
- Monthly meetings of the Association's Board of Directors
- Periodic meetings of the Research Committee of the Association to review research needs of the industry and initiate research activities.
- The annual business meeting of the Association, November 16 and 17.
- Various promotion and marketing activities including:
  - Operation of the Blueberry Patch at the N.S./N.B. border.
  - Participation in various food promotion shows.
  - Work in support of the annual blueberry harvest festival and other local blueberry festivals.
  - Development and printing of various promotional pamphlets and brochures.

5.3.8 Land Assessments and Evaluations

Requests for land assessments are received on a regular basis from potential new growers or persons or companies buying or selling blueberry land. The healthy state of the industry creates a continuing interest in the development of potential acreage and the improvement of established fields.

5.3.9 Information Coordination and Consulting Services

One of the principal activities in the blueberry extension program is the provision of a consulting and coordinating service for all phases of the blueberry industry including growers, other government departments, etc.

5.3.10 Land Clearing and Improvement Policy

Assistance for clearing and improving lowbush blueberry land was available under the Nova Scotia Land Improvement Policy in 1990. The following is a summary of work carried out under this policy in 1990:

Table 5.3: Summary of 1990 Land Clearing and Improvement Policy

Blueberry Land Clearing	347 acres	$69,111.54	$200/acre
Blueberry Land Improvement with Heavy Equipment	936 acres	$160,679.44	$157/acre
Firebreak Construction	45,037 feet	$5,545.47	6 cents/ft

5.3.11 The Nova Scotia Blueberry Institute

The Nova Scotia Blueberry Institute had a busy and productive year in 1990. Work continued on development of the field site and physical facilities of the Institute in Debert. Regular maintenance work at the Debert site involved weed, disease and insect control on producing acreage; building repair; maintenance of on-site research plots and demonstration areas; and harvesting 18,000 pounds of blueberries. Two students were hired to assist the BPANS during the summer.

The Board of Directors of the NSBI held meetings on May 31 and November 6. Jim Goit was introduced as the new Chairman of the NSBI. A letter of appreciation was sent to past Chairman, Dave Sangster.

Some of the research projects and industry activities assisted in by Extension personnel and the Institute are:

- Effect of Rolling on Soils and Blueberry Yields (Researcher: Delmar Holmstrom)
- Development of Automatic Speed Control Mechanism for Blueberry Mechanical Harvester (Researcher: Kevin Sibley)
- Performance and Costs of Straw Spreaders for Lowbush Blueberries (Researcher: Kevin Sibley)
- Two and Three Year Management Study (Researcher: Dr. Leonard Eaton)
- Effects of Irrigation on Lowbush Blueberries (Researcher: Dr. Leonard Eaton)

- Blueberry Weed Identification Guide
- NSAC Library Collection of Lowbush Blueberry Publications
- Revision of NSBI Publications
- Data Base Survey (Researcher: Dr. Leonard Eaton)
- Long Term Nutrition Studies (Researcher: Dr. Leonard Eaton)
- Select Clone Hybrid Seedling Plantings (Researcher: Dr. Leonard Eaton)
- Long Term Nutrition Studies (Researcher: Dr. Leonard Eaton)

5.3.12 Resarch Activities

A number of research projects were assisted by providing grower contacts or assistance with plot work during the 1990 season. Most involved a cooperative effort between the researcher, extension personnel and the Nova Scotia Blueberry Institute. A few of the principal projects are:

- A study of the effects of mulching on regeneration of blueberry plants in areas which ahve been disced and rolled for land levelling. (Researcher: Dr. Leonard Eaton, NSAC)
- A number of research trials to evaluate herbicides for use against bunchberry and other Velpar escape weeds. (Researcher: Glen Sampson, NSAC)
- Long term nutrition studies. (Researcher: Dr. Leonard Eaton, NSAC)
- An evaluation of heavy machinery which can be used for levelling and rock and stump removal in established lowbush blueberry fields. (Researchers: Agricultural Extension Engineering staff and Plant Industry staff)
- Select clone hybrid seedling plantings for demonstration and observation (Researcher: Dr. Leonard Eaton, NSAC)
- Data base survey (Researcher: Dr. Leonard Eaton)

Chapter 6

VEGETABLES

Charles N. Thompson

6.1 OVERVIEW

Acreage 12,230 — an increase of 110 acres from 1989. Value of production at least 13.4 million dollars (a decrease of 3.5 million dollars from 1989) at the farm gate — from a marketable production of 148.6 million lbs. (down 31.4 million lbs. from 1989).

Crop yield and quality was generally good but potato yield was a problem both on the early and processing markets due to the wet May and a hot, dry July and August. The wet May led to processing pea crops which were only one half of last year's yield. Cabbage, carrots and cauliflower suffered under hot and dry conditions so yield and quality were negatively affected. The low price for potato crop contributed to the decline in gross farm sales. Some potato varieties did not yield well even when irrigation was supplied. This may be due directly to the cultivar's response to the high temperature in August. There was a serious problem with diamondback moths in cole crops. Our one processing brussel sprout grower lost much of his crop potential. Cabbage and cauliflower crops were also hard hit leading to a shortage of green leafy cabbage. Storage crops are of good quality and they are anticipated to keep well in storage. Marketings to wholesale and production of specialty crops were again on the rise this year. With overall lower yields and prices net returns for growers will be down substantially in 1990. This has left many growers considering their growing strategy for 1991.

6.2 NOVA SCOTIA 1990 POTATO CROP YEAR

Table 6.1: Markets and Cultivars

Chipping	Norchip	40%
(Hostess Frito-Lay)	Norwis (657)	25%
	Superior	20%
	Monona & Atlantic	10%
Early Fresh Market	Superior	95%

Seed: mainly Norchip and Superior but small lots of 10 cultivars in total.

Table 6.2: Potato area 1990

(acres)	(hectares)
4500	1822
Early 1500	607
Processing 2850	1154
Seed 150	61

Table 6.3: Crop volume and value 1990

Volume — 81,000,000 lbs. / 36,818,181 kg
Average yield — 180 cwt/ac / 19,800 kg/ha
Average Price — .06 per lb. / .13 per kg.
Total Crop Value — $4,860,000

6.3 THE 1990 SEASON

An excellent spring planting season was interrupted in mid May with heavy rains that did not stop until early June. This meant a late planting date on much of the processing potato crop. The hot, dry weather which followed was quite good during late June and early July but the early potato crop set only a light crop which were late coming to the marketplace. As well, the market price was low for early potatoes. The quality of the early potatoes was good but skin set could have been better. The price of processing potatoes is determined by the spot market from mid July to the first of September. This meant a lower price for these potatoes this year. The quality of the chipping stock in storage appears to be excellent but many growers came in well under their contract amount due to the low yields. The crop was harvested by mid October. Overall yields of fresh and processing potatoes were down at least 20 percent from last year.

6.4 MARKETS FOR NOVA SCOTIA POTATOES

6.4.1 Early Market

"Superior" is the main cultivar used for early potatoes and 5, 10, 20 and 50 lb. packs are produced. It is mainly the 5 and 10 lb. packs that are sold in Nova Scotia and Newfoundland. Early count pack potatoes are "Superior" followed by "Norkotah". (Only two operations producing these packs.)

6.4.2 Processing Potatoes (for chips)

Even irrigation did not seem to be as effective this year at increasing yields, perhaps because of the hot weather and physiology of the cultivars being grown — "Norchip" did not do well. "Norwis" was better yielding but did have some scab. We are continually looking for a better processing cultivar. Hostess Frito Lay was our major processor, but Millie's Potato Chips of Dartmouth was back in business.

6.4.3 Seed

We have only one major seed grower with mainly "Norchip", "Norwis" and "Superior". Small lots over 10 cultivars were grown.

Table 6.4: Vegetable Statistics

NOVA SCOTIA VEGETABLE PRODUCTION STATISTICS 1990
ESTIMATED N. S. VEGETABLE CROP AREA PLANTED IN 1990

VEGETABLE	VEGETABLE AREA		CHANGE FROM 1989	
	Hectares	Acres	Hectares	Acres
BEETS	40	100	0	0
BROCCOLI	157	390	73+	180+
*BRUSSEL SPROUTS	20	50	0	0
*CABBAGE	184	455	10-	25-
*CARROTS	569	1405	95-	235-
CAULIFLOWER	81	200	0	0
SWEET CORN	296	730	4+	10+
CUCUMBERS	40	100	0	0
LETTUCE	93	230	8+	20+
PARSNIPS	20	50	0	0
*TOMATOES	28	70	0	0
RUTABAGAS	165	410	28+	70+
*SNAP BEANS	486	1200	121+	300-
*PEAS	676	1670	69+	170+
PUMPKINS & SQUASH	124	305	2+	5+
BAKING BEANS	40	100	12+	30+
*POTATOES	1822	4500	81+	200+
**MISC	107	265	6-	15-
	4948	12,230	45+	110+

Source: Statistics Canada information where it is available and estimates of the Vegetable Specialist.
* includes processing acreage
** eg, spinach (80), yellow onions (75), green onions (1), rhubarb (20), peppers (15), summer savory (15), melons (10), witloof chickory (6), parsley (5), radish (5), leeks (5), Chinese vegetables, swiss chard, other herbs, kohlrabi, broad beans, gourds, Indian corn, eggplant, celery, endive.

6.5 PESTS

Colorado Potato Beetles and larvae were plentiful and there was some difficulty in getting control. Foliar sprays of pyrethroid and organophosphate insecticides were generally rotated. Little granular insecticide was used.

Tarnished Plant Bugs were more active on potatoes than usual. Late Blight was conspicous by its absence from potato fields. Early Potato Breakdown in retail packages was probably due to the poor skin set. Common Scab was not a serious problem with "Norwis" having the greatest level of infection.

Seed Piece Rot was a problem due to the wet, cold weather conditions of mid to late May.

Table 6.5: Vegetable Production Summary

ESTIMATED VEGETABLE PRODUCTION IN NOVA SCOTIA FOR 1990					
CROPS	ACRES	YIELDS lb/ac	TOTAL LBS	PER LB RETURN	TOTAL FARM GATE RETURN $
BEETS	100	10,000	1,000,000	.10	100,000
BROCCOLI	390	4,000	1,560,000	.40	624,000
CABBAGE	455	20,000	9,100,000	.10	910,000
CARROTS	1405	18	738,000		
PEAS	1670	1,740	2,905,800	.18	523,044
SNAP BEANS	1200	4,740	5,688,000	.10	568,800
PUMPKIN/SQUASH	305	12,000	3,660,000	.08	292,800
BAKING BEANS	100	1,000	100,000	.80	80,000

Chapter 7

MAPLE

D. W. McIsaac, Horticulturist

7.1 OVERVIEW

7.1.1 1990 PRODUCTION

Number of producers:	68
Number of taps:	259,350
Pure maple syrup produced:	93,193 litres
Average Return to Grower:	$8.58/litre
Farm Gate Worth:	$799,500

Average yields in 1990 were slightly less than the average yields over the past 17 years.

The colour of the syrup made was darker overall than in 1989, but the flavour was found, in most cases, to be very good.

Ninety-five percent of the taps in Nova Scotia were connected to plastic tubing systems. Sap from the remaining 5% of taps was collected in buckets.

7.1.2 PRODUCTION SINCE 1960

PERIOD	AVERAGE ANNUAL PRODUCTION (litres)
1960–64	18,002
1965–69	24,184
1970–74	28,085
1975–79	42,323
1980–84	59,543
1985–89	71,827

7.1.3 MARKETING

A big achievement in 1990 was the formation and development of the Maple Co-operative of Nova Scotia Limited. Twenty-eight producers, including many of the largest producers in the Province have purchased memberships in the Maple Co-op of Nova Scotia.

A building was purchased in Leamington, Cumberland County and renovated. This building will house receiving, packaging, shipping storage facilities as well as office space for the Maple Co-op of Nova Scotia. The Blueberry Producers Association of Nova Scotia will also have their offices in this building.

Most of the production from 1990 has been sold. Very little inventory will be carried forward into the 1991 season. This is a very different situation from the one found in several other maple producing areas where large inventories will remain in storage leading into the 1991 producing season.

7.2 EXTENSION ACTIVITIES

7.2.1 MAPLE CO-OP OF NOVA SCOTIA LIMITED

During the final quarter of 1990, considerable work was necessary to help develop the co-op idea. The Maple Specialist acted as an advisor to the Maple Co-op of Nova Scotia Board of Directors.

7.2.2 MAPLE PRODUCERS' ASSOCIATION OF NOVA SCOTIA

The Maple Specialist worked very closely with the Maple Producers' Association of Nova Scotia on programs and projects such as: Silvilog '90, MPANS Annual Meeting and Maple Festival of Nova Scotia. Some initial planning was done for the 1993 North American Maple Syrup Council Annual Meeting, scheduled to be held in Nova Scotia.

7.2.3 MAPLE PRODUCTS POLICY: 1989-90

Number of Applications Approved:	19
Total Grants Paid Out:	$46,443.78

7.2.4 PROMOTION

Staff of the Marketing Branch, the Promotion Committee of the Maple Producers' Association of Nova Scotia, and the Maple Specialist work together on several projects to promote the Maple Industry and to promote increased consumption of Maple Products.

- Swing into Spring
- Maple weekends at Ski Wentworth and Ski Martock
- A Maple Week with various local motels
- Maple Festival of Nova Scotia (19 individual festivals)
- Silvilog '90
- Development of pamphlets, brochures, posters, etc.

7.2.5 GENERAL EXTENSION

- Assessed maple woodlots for potential
- Provided advice re: All aspects of management and production item Wrote/issued Maple Newsletters and Fact Sheets
- Spoke about Maple Industry to various groups
- Attended North American Maple Syrup Council Meetings in Batavia, New York.

Chapter 8

GREENHOUSE

By Brian Toms, Horticulturist
Beverly MacPhail, Horticulturist
Arthur Haskins, Technician
Kim Best, Technician

8.1 OVERVIEW

The 1990 crop year for greenhouse production proved to be a difficult one for many growers for a number of reasons. Greenhouse area and numbers of producers remained stable but all sectors of the industry had some problem areas.

Marketing continued to be a major concern for greenhouse vegetable growers with periods of price instability caused mainly by external market forces.

Bedding plant growers suffered through a period of very poor sales in the month of May as a result of extremely wet weather. Conditions improved in June and sales recovered to some extent.

Market demand for cut flowers and potted plants from Nova Scotia producers remained flat during 1990. Possible causes included; increased imports, some problems with product quality, and the beginning of the recession.

Pest and disease problems continued for some growers but the introduction of new technology in spray application and an increasing awareness of the need for prompt action has resulted in better control of the recently introduced pests.

New technology has also gained greater acceptance in the propagation of bedding plants, hydroponics for vegetable production and in labour saving in all sectors of the industry, indicating that growers remain confident that the industry will continue to improve productivity and profitability.

8.2 NOVA SCOTIA GREENHOUSE INDUSTRY STATISTICS

Sales of greenhouse products take place in all 12 months of the year and as a result, figures for 1990 were not available at the time this report was prepared. Statistics Canada's greehouse industry survey for 1989 appears to have left nearly ten per cent of the greenhouse area unaccounted for and for this reason we are including industry statistics for the years 1988 and 1989 in this report.

Table 8.1: General Greenhouse Statistics

TOTAL INDUSTRY	1988	1989
Size	177,118m^2	160,306m^2
Sales	$17,719,740	$15,540,358
Number of Producers	44	38*
Number of Employees	803	822
ORNAMENTAL PLANT SALES		
Total Sales	$16,024,714	13,619,325
Number of Producers Reporting	35	30*
Average Sales/Growers	457,849	453,977
VEGETABLE CROPS		
Total Sales	1,695,026	1,971,033
Number of Producers	15	13*
Average Sales/Growers	113,002	151,618

* Some growers produce both greenhouse vegetable and ornanmental crops.

Table 8.2: Average Industry Expenses, 1989

	Industry Total	$ Cost/m^2
Fuel	$1,312,072	$8.18
Payroll	$5,946,126	$37.09
Purchases	$6,131,018	$38.24
Total	$13,389,216	$83.52
Industry Investments		
Total	$21,226,375	$/m^2 132.41

Table 8.3: Greenhouse Crop Profile

ORNAMENTALS	m^2
Cut Flowers and Potted Plants	77,000
Poinsettias*	23,500
Bedding Plants*	65,500
VEGETABLES	
Tomatoes	17,400
Cucumbers	17,200

* Spring bedding plants and Christmas poinsettias are seasonal crops and often occupy the same greenhouse space.

There are many greenhouse operations below the minimum size included in the annual greenhouse survey and our current growers list totals 87 producers with significant production area. Most of the smaller growers produce bedding plants and it has been estimated that the farm gate value of this additional production would be between $500,000.00 and $1,000,000.00.

8.3 COMMODITY REPORTS

8.3.1 Flower Crops

Cut roses and chrysanthemums continue to be the major cut flowers produced in Nova Scotia greenhouses at Avon Valley Greenhouses, Falmouth, Scotia Greenhouses, Woodville and Gordon's Greenhouses at Oxford. Hydrophonic cultivation of cut roses is being investigated at Avon Valley Greenhouses. This technique is used in Europe where it has resulted in increased production in the first year of the crop.

Alstroemenia production at Gordon's Greenhouses continues to be successful with a 25% increase in area in 1990. An experiment, using high intensity discharge supplementary lighting was successfuly completed in 1990. Production was greatly increased and the cropping season was extended so that production was available over a longer period and harvesting labour peaks were reduced.

Other minor cut flowers such as snapdragons and cut lilies are no longer grown but are now imported along with increasing quantities of other speciality items and flowers such as carnations, chrysanthemums and florists greens. Mixed bouquets are now available, along with individual cut flowers in more chain store locations, and sales of these items are showing a healthy increase. Consumer interest and demand for dried flowers continues to be good and several growers will be expanding their production of these crops.

8.3.2 Potted Plants

These crops include pot chrysanthemums, tropical foliage plants, and asaleas which are grown on a year round basis and poinsettias and Easter lilies grown as holiday crops. Mother's Day is now the most important holiday crop market followed by Christmas and Easter.

Demand for flowering potted plants are continuing to increase whilst foliage plant sales are steady. Market outlets in chain stores are also making gains whilst sales through retail florists remain static.

There was increased production of poinsettias for the Christmas markets in 1990, partly because more bedding plant growers decided to grow a second crop and also because rooted cuttings are now readily available from Nova Scotian propagators. New varieties also increased in popularity as did use of differential temperture regimes to control plant height. These temperature regimes enable a grower to reduce and in many cases eliminate, the use of chemical growth regulators.

8.3.3 Bedding Plants

The 1990 bedding plant season was noteable for a period of very poor weather during May, which resulted in very low sales during the early part of the marketing period. The weather improved in June and sales picked up, although many growers suffered in reduction in overall sales value for the year.

The numbers of bedding plants grown in 1990 was very similar to 1989 and the rapid production increases of recent years was not apparent. The introduction of plug growing technology has resulted in a number of local growers setting up as propagators, supplying both bedding plant plugs and rooted cuttings of geraniums and fuchsias to other growers who can use this material to increase productivity and to develop more flexible cropping programs.

8.3.4 Greenhouse Vegetable Crops

This was a difficult year for greenhouse vegetable producers due to disruption of traditional price structures in the market and reduced production levels caused by pest and disease problems at a number of operations.

Marketing problems for greenhouse growers started in January when Florida growers lost crops to frost damage. Many of these growers replanted with new crops which came into production at the same time as local greenhouse crops. Prices in the market reflected the oversupply situation. Cucumber growers also suffered from low prices which were the result of market disruptions and very low prices in Ontario.

Pest and disease problems include extensive thrip damage to a cucumber crop, fusarium crown rot and

pythium root rots on tomatoes. The presence of fusarium crown rot has led one grower to convert his operation to a rock wool system for 1991. This is the second large operation in Nova Scotia to change to this technology. A new tomato variety (Trend) which has genetic resistance to fusarium crown rot was successfully grown on a trial basis in 1990 and will probably become the predominant variety in 1991.

8.3.5 Greenhouse Growers Association of Nova Scotia

The Association held two general meetings and seven directors' meetings during the year all of which were attended by the greenhouse specialists. At the Annual Meeting in September, general membership expressed interest in the possibility of forming a Bedding Plant Marketing Board and also in expanding the bulk purchasing scheme currently used for greenhouse polyethylene to include other items commonly used in the industry. The Association has formed sub-committees to investigate both of these proposals. Market promotion also continues to be major program for the Association with more emphasis to be given to mall promotions and exhibits at garden shows.

8.3.6 Nova Scotia Greenhouse Vegetable Marketing Board

Several meetings were attended by invitation particularly in the early part of the season when marketing difficulties were experienced as a result of oversupply, both from Florida and from Maritime producers. Communication and co-operation between growers in all three Maritime provinces improved as a result of these marketing problems and culminated in the formation of a Maritime Greenhouse Vegetable Producers Association.

8.4 GREENHOUSE EXTENSION TRAVEL

The greenhouse extension staff travelled outside the province for educational meetings and tour.

The Atlantic Advisory Committee on Ornamental and Greenhouse Crops held their summer tour in the Annapolis Valley and Halifax, June 19 and 20. Brian Toms and Bev MacPhail participated in the tour of nurseries, greenhouses and the City of Halifax Parks and Grounds Department.

Bev MacPhail attended the 1990 New England Greenhouse Conference, October 22–25, at held at Sturbridge, Massachusetts. The three day conference had a trade show with 95 exhibitions and concurrent educational programs on interior landscape, pest management, outdoor cut floweres, new crops, new technology and marketing.

The two days before the conference were used to tour retail garden centers and farm markets in Massachusetts.

Brian Toms and Bev MacPhail attended the Atlantic Advisory Committee meetings in Memramcook, New Brunswick, November 7 and 8.

8.5 GREENHOUSE EDUCATIONAL PROGRAM

There were educational programs offered to greenhouse growers during 1990.

There were two poinsettia discussion days held; February 8, 1990, to review the 1989 season and August 8, to prepare for the 1990 Christmas crop.

An evening bedding plant meeting was held at Don Nicholson's, Baddeck, on May 9, 1990. Don Nicholson gave a tour of his operation followed by an informal discussion with the bedding plant growers and extension specialists. This evening meeting at a growers greenhouse has become an annual Cape Breton bedding plant event.

Bev MacPhail was a speaker at the Direct Marketing Challange held March 26-27 at the Sheraton Hotel, Halifax. The talk was on care and maintenance of bedding plants and nursery stock at a retail outlet.

An outdoor cut flower day was held August 21, 1990, at the Kentville Research Station. The growers of outdoor cut flowers, both fresh and dried, discussed flower varieties and production techniques. These growers are trying to establish commercial operations but there is limited technical information on outdoor cut flower production.

A tour of the greenhouse and nursery trials was held August 22, 1990 at the Kentville Research Station for greenhouse and nursery growers and retailers. Dr. Peter Hicklenton and Bev MacPhail conducted a tour of the trial sites and prepared a booklet with a summary of their work.

A public education display was prepared by Brian Toms and Arthur Haskins for the November 2, 1990, Open House, at Harlow Institute, Truro. The display focused on the biological control of greenhouse pests and the tomato and cucumber variety trials.

An introductory bedding plant course was held November 14–16, 1990 for new entrants.

The Greenhouse Growers' Association of Nova Scotia Annual Meeting, September 19 and 20, had an education program for the greenhouse growers. Gerald Buyting, a bedding plant grower from Fredericton, New Brunswick, spoke on the bedding plant marketing in New Brunswick. Mel Sawaya, Focus Greenhouse Management, Inc., gave a workshop on plug production of bedding plants. The greenhouse vegetable program dealt with biological control of greenhouse pests. Results of the greenhouse vegetable trials conducted at Truro were also presented and discussed.

Brian Toms and Bev MacPhail participated in talks to Nova Scotia Agricultural College students, home garden meetings, and other short courses.

Chapter 9

LANDSCAPE/SOD/ORNAMENTALS AND HOME GARDENING

Richard. S. Morton, Horticulturist
Leslie F.S. Blackburn, Technician
Pat Pelham, Technician (Annapolis Royal Historic Gardens)
Peter McCabe, Summer Assistant (Alumni Gardens)

Others assisting with program:

- M. Blenkhorn, Horticulturist (Nova Scotia Garden Guide, Hot Line, Correspondence, Meetings, Calls)
- R. Delbridge, Plant Pathologist (disease problems)
- L. Crosier, Entomologist (insect problems)
- J.P. Thomson, District Weed Inspector (displays, identification)
- W. Thomas (grass identification)

9.1 OVERVIEW—LANDSCAPE SOD AND ORNAMENTALS

This year once again the industry slowed down with a slow start for the plant sales season, both at nurseries and garden centres. Although recovery took place with the arrival of warm weather, sod growing continued its expansion amid problems with germination, weed invasion and towards the end of the season a shortage of sod. Landscape construction and maintenance seemed to have lots of work in the early season, a very slack period during summer and a pick-up in the fall. Ornamental nurseries continued to develop, especially one at Berwick.

In all there was an advance of 2%–4% for the season in industry value.

9.2 HOME GARDENING

Home gardening programs continued with the garden clubs and societies. Rural Beautification continued its promotion of beautification in rural Nova Scotia. Radio programs continued with the Nova Scotia Garden Guide information. Cultural information requests through the mail and office consultations were all dealt with and numbers were similiar to last year. The Historic Gardens at Annapolis Royal continued its development as did the Alumni Gardens at the NSAC. Both continue as examples of excellent plant collections.

9.3 POSITIVE DEVELOPMENTS DURING THE YEAR

- Excellent sod growers field day and demonstration at Amherst, very good attendance.
- A meeting with Federation of Agriculture and representatives of sod growers to provide information on sod growing and the fact that it does not cause the topsoil to be destroyed. This issue brought the sod growers together on two occassions to work together.
- A successful Garden and Patio show again had the industry working together. This show will again be held in 1991.
- Landscape Nova Scotia, under the AFDA agreement, has developed a logo, a brochure, will be working on technical sheets, and a promotional display kit. Again, this has a lot of people working together to promote their industry.
- Landscape Nova Scotia has also developed a set of landscape standards in co-operation with the Nova Scotia Association of Landscape Architects. This is the first time these two groups have worked closely together.
- Rural Beautification Committee is concentrating on many new directions for the program.
- Nova Scotia Association of Garden Clubs has developed a fine program library of slides and videos for group programs.

9.4 CONSTRAINTS AND CONCERNS

- Although headed off, at present there continues to be opposition to sod growing, assuming sod removal is destroying topsoil.
- The whole industry is affected by the fact that topsoil removal for landscape projects is causing increasing concern. The development of manufactured topsoil seems too expensive at present.
- Plant and soil refuse from construction projects is being refused, or high dumping fees charged, at landfill sites. Perhaps the answer lies somewhere in composting.
- Sod production and ornamental nursery production has some good farm gate figures for "Nova Scotia Statistics" but somehow are not being included in the publication.
- The annual grant to horticultural societies has not changed since 1945 and at fifteen dollars seems inadequate.

9.5 COMMODITY GROUP

Landscape Nova Scotia represents garden centres, sod growers, landscape construction, landscape maintenance, lawn service and ornamental nursery growers. The organization has had an exceptionally active year, spurred on by the AFDA agreement promotional project. Membership is increasing. Currently *Hort East*, a joint convention and trade show, is being worked on in co-operation with the greenhouse growers for 1993. Under the direction of the 1990 president, Stan Kochanoff, an active program was pursued involving specifications development, composting, the topsoil issue and the AFDA promotional project. Landscape Atlantic is the umbrella group over Landscape Nova Scotia and Landscape New Brunswick, functioning mainly as a liason with Landscape Canada and having a regional annual convention.

9.6 GOALS OF THE EXTENSION PROGRAM FOR 1990

- To try to maintain and strengthen the base of home gardening groups and their programs throughout the province.
- Work closely with the landscape trades and their organisation, Landscape Nova Scotia.
- Concentrate more on sod growing extension and help to growers.

9.7 EXTENSION PROGRAM—HOME GARDENING

- Garden clubs, horticultural societies and other groups effectively carried out their programs of flower shows, beautification, and dispensing information. New groups started up in Milford and Baddeck.
- Rural Beautification continued their program of contests, grants and promotion of beautification in rural areas. Program adminisited by Rural Beautification Committee.
- Flower shows were held at 37 locations. These included regular shows and specialty shows. A giant show in the Halifax area *Flowers of the Atlantic* sponsored by a number of garden clubs and the metro centre put on a good show but decided to discontinue after two shows. A similiar show in Cape Breton *Flowers of Cape Breton* was a real success in its first year.
- Nova Scotia Association of Garden Clubs was an effective volunteer group that guided and helped the overall gardening program in Nova Scotia. Time and effort was spent with this group to help groups keep active programs through district or area meetings of garden groups. This organization, along with the newsletter *Landscape and Ornamentals*, is the cornerstone that helps to keep the garden groups and their programs going.
- Information services offered during the year included the radio program *Nova Scotia Garden Guide* which supplies information the home gardener to head off calls and letters to the office. Office consultations were up this year perhaps in the area of five hundred. The telephone hot lines at Truro and Kentville dispensed information on all kinds of horticultural problems. Call load was similiar to last year.

Table 9.1: Organized Gardening Groups In Province

TYPE	NUMBER	MEMBERSHIP
Garden Clubs	38	1002
Horticultural Societies	6	333
Specialty Societies	5	205
Total	49	1570

Specialty groups include Dahlia, Rhododendron, Orchid and African Violet Plant Societies.

9.8 EXTENSION PROGRAM—LANDSCAPE SOD AND ORNAMENTALS

9.8.1 Sod Growing

Sod growing continues its expansion. The four larger growers continue to add to their acreage. Growing problems are coming to the forefront after several crops have been grown on an area. Weed invasions

were worrysome and as well as leaf spots, problems in the valley. The unusual growing season gave rise to germination problems in many areas, home lawns establishment as well as sod growing areas. There was an actual shortage of sod during the fall. Spring crops should cure this however.

9.8.2 Garden Centers and Sales Outlets

Sales of ornamental plants had a disastrous start in April and May due to the weather. June, however, was better than any month on record but did not make up the losses in April and May. The rest of the seaon was comparable to other years. Plant sales in general were up 5%.

9.8.3 Ornamental Nurseries

Ornamental nurseries continue to expand with developments at Berwick (Paul Grimm) and Wilmot (Speth's). Springvale Nurseries at Berwick has become a wholesale supply for many in Nova Scotia replacing some imports from Ontario. New Brunswick Nurseries at Sussex and Millstream aggressively marketed in Nova Scotia during the year.

9.8.4 Landscape Construction and Maintenance

Construction contracts were sufficient to keep everyone busy in the spring. A few large contracts were evident and competition increased. The industry was quite depressed in June, July, and August, but picked up in the fall. Overall it was a good year.

9.8.5 Lawn Service

Caring for lawns professionally is increasing in the province. There are approximately seven companies operating in the Halifax Dartmouth area. One large company, the "Weed Man" is expanding across the province with its franchized operation. Estimates are they service over two thousand homes and grounds in the Metro area.

9.8.6 Plant and Winter Injury

It was a season of severe injury to many plants in the winter of 1990. Roses, perennials, and even mature trees were damaged or killed.

9.8.7 Highway Plantings

The rotary plantings at Pictou are beginning to show promise. We have been working closely with the Department of Transportation to make one interchange successful, in hopes it will be tried across the province. New trees were added in 1990 and our fertilizing program continued.

9.9 DISEASES AND INSECTS

- Dutch Elm disease continues its rampage across the province.
- Slugs and earwigs were the most prevalent pests.
- Turfgrass leaf spot was a serious problem in the valley area.

Table 9.2: Service Statistics

	1986	1987	1988	1989	1990
TELEPHONE HOT LINE SERVICE					
Kentville	2561	2693	2731	2588	2643
Truro	1611	1550	2277	1630	1691
CORRESPONDENCE (cultural information requests)					
Kentville	245	188	210	215	110
Truro	631	590	251	249	306
TOTAL	876	778	461	464	416
LANDSCAPE PLANNING					
Detailed Plans Drawn					7
Sketches and Outlines					6
GENERAL OFFICE CONSULTATIONS					558
HOME GARDENER CALLS					89
MEETINGS (SPEAKER OR COMMITTEE)					
Nursery Trades					32
Home Gardening					45
General					21
TOTAL					98

9.10 RECREATIONAL TURF

Development of sports fields and golf courses has continued to expand. One golf course was sodded during the year. Staff time is spent with cultural growing problems as well as establishment of grasses.

9.10.1 Turf Trials

We continue to operate the turf trials at Brookside (Truro) for variety trial information, short-course use, field days and grower information.

9.11 GENERAL ACTIVITIES

9.11.1 Committees and Other Duties

Staff time was put into these committees to help promote our gardening goals during the year.

- Rural Beautification (government representative)
- Annapolis Royal Historic Gardens (design and advisory)
- Landscape Atlantic (board, advisory, research)
- Greenhouse and Ornamentals Subcommittee (chairman)
- Federal/Provincial AFDA (applications—Landscape Sod and Ornamentals)
- Landscape Nova Scotia (recording secretary)

- Nova Scotia Agricultural College (grounds advisory)
- Nova Scotia Association of Garden Clubs (board member, convention)

STATISTICS

Table 9.3: Landscape Sod And Ornamentals—1986 Data Plus Estimates

Value of Industry	
Payroll	$19,800,000
Employees	$ 4,000,000
	1,387 (19 per business)
Sod	
acres in production	3,500
acres harvested	1,500(value in excess of six million)
sod growers	22 (75% of industry controlled by four growers)
Landscape Contractors	
Landscape Maintenance	56 establishments
Ornamental Nurseries	13 establishments
Miscellaneous Ornamental	250 acres in production and 20 establishments
Sales Outlets	
Garden Centres	54 establishments
Arborists	36 establishments
Lawn Service	8 establishments
Total Landscape Sod and Ornamentals Establishments	10 establishments
	197
General Statistics	
Overwinter sealed plant storages	8
Hydroseeders in province	10
Tree spades in province	5
Recreational Turf	
Playgrounds	600
Baseball Diamonds	175 sports fields average 1.5 acres
Softball Diamonds	300 estimated total turf 3015 acres
Sports Fields	710
Golf Courses	42 with 1,680 acres in turf
Lawn Bowling Greens	8 with 8 acres in turf
Estimated acreage involved in recreational turf	4,700+
Grower Calls (Sod and Nursery)	
Field Calls	260
Industry Values in Other Maritime Provinces—1989	
New Brunswick	9 million dollars
Prince Edward Island	3.7 million dollars
Newfoundland	1.5 million dollars
Regional Value of Landscape	
Sod and Ornamentals	$34,000,000

Chapter 10

HOME GARDENS

Myrna J.Blenkhorn, PAg.

10.1 OVERVIEW

Once the gardening season arrived in 1990 we were able to assess the amount of winter damage to plants. Most people lost their rose bushes which was mainly a result of the long frost free period in the fall of 1989 and sudden arrival of winter. As the season progressed it was observed that other plants were also affected by the winter. Rhododendrons suffered more than normal, while raspberries in many areas were killed completely. Some trees had dieback and flowerbuds were damaged on various trees and shrubs. Bark damage on mature trees was also noticed when trees died in June and July after leafing out.

The spring growing season was delayed by cool, wet weather. The ground was saturated which may have been a reason for the numerous calls we received about ants in homes early in the season. The cool, wet weather continued into late May making conditions for pollination difficult.

One major disease in 1990 was phomopsis canker on evergreens, particularly junipers. Many junipers suffered winter injury which allowed this disease to enter the plant. Bacterial blight of lilacs was common as were many of the diseases which go with a cool wet spring.

Later in the summer drought symptoms on trees, shrubs and lawns were noticed. The damage from the drought stress on trees will be carried over the next few years. Research has shown that the effects of this type of stress will not be fully visible for two years. This is one of the reasons why tree problems are so difficult to diagnosis as the damage to the tree is done a number of years prior to the symptoms appearing.

One insect which we received a lot of calls about this year was the rosy maple moth. It was found in very large numbers in wooded areas of Kings County as well as throughout the Maritimes. The expected number of larvae did not materialise later in the season for unknown reasons.

Mites on bedding plants has become a common summer problem as well as thrips. Earwig calls have been less numerous maybe because everyone has these insects but not in great numbers.

People are becoming more concerned about the environment (which doesn't mean they are more knowledgeable). Many people are getting into recycling and composting. Some of the people that we talk to are asking about pesticide safety — is it harmful to their pets, children and themselves. Products which are listed as being environmental friendly have caught people's attention — such as the lady who wanted an environmental friendly rat poison (maybe a cat would fit the bill). I see a real need to educate the public with good, sound information on pesticide safety, food safety and agriculture in general.

During the early months of the year we receive a lot of requests for information for school science projects. Sometimes we are able to provide the information but often the material we have is too technical for the students, but in some ways shows that the information and the service we provide to growers and the public is fitting the bill.

One question which we received this past summer was about algae in ponds. Many people have this

problem but we were unable to give them recommendation for an immediate cure.

10.2 NOVA SCOTIA GARDEN GUIDE

This was our 12th year for the radio series, Nova Scotia Garden Guide. This series deals with specific gardening topics including insect and disease problems, culture of many plants, new varieties as well as some Home Economics topics. This year the series was carried by 16 radio stations throughout Nova Scotia. The series runs for 26 weeks from mid-April to mid-October. Preparation of the information for the scripts is done in December and January before being passed on to Orville Pulsifer & Associates for the scripts to be written and voiced.

10.3 GARDEN COURSES AND MEETINGS

I participated in a number of gardening courses (these courses take place over a number of evenings, days or a full-day). The Valley Gardeners Garden Club in Kentville have established a basic gardening course which they hold every April. I usually speak about what the Department has to offer to gardeners at this course. Other courses which I participated in were Shubie Co-op, Milford; Co-op Atlantic Staff Training, Truro and YWCA Small City Gardens, Halifax.

The garden club meetings which I attended and spoke at were Valley Gardeners (Kentville); Haliburton Garden Club (Windsor) and Chester Garden Club. I attended the annual convention of the N.S. Association of Garden Clubs in June.

Other groups which I spoke to on gardening were Kentville Hobby Crafters, Vocational Students in the Radio and T.V. Course, Enserinks Open House, Pereau Baptist Church Auxiliary, a Bridgewater Sub-division Environment Group and the Grand Pre Women's Institute.

This was the second year that I was involved in the Kings County Science Fair as a judge.

The Garden & Patio Show is a major event to start the gardening season. This was the second year the Department has been involved with it as a major sponsor. The show was held on April 7 – 8 at the Metro Centre. The show attendance was over 6000 with exhibits featuring all aspects of gardening and outside living. Our booth dealt with garden inquiries and tried to provide information on gardening.

10.4 COMMITTEES

I have been a member of the Education Committee of the Nova Scotia Fruit Growers Association for a number of years. Some of the responsibilities of the committee are the Fruit Growers Museum, the Apple Blossom Dessert Contest, the float and booth for the Apple Blossom Parade and the Golden Apple Award. This committee meets weekly during late April and May and as required the rest of the year.

Other committees which I am involved with are the Exhibition Evaluation Committee and Greenhouse & Ornamentals Advisory Committee of the Atlantic Crops Committees. For the Exhibition Evaluation committee I evaluated the Shelburne County Exhibition and the Atlantic Winter Fair.

The Greenhouse and Ornamentals Committee held a summer tour this year in the Valley and Halifax area. We visited Springvale Nurseries, Hennigars Farm Market and toured Dr. Hicklenton's plots in Kentville on June 19. On June 20 the tour moved to Halifax to visit the city of Halifax Public Works Department composting project and the Public Gardens. This committee also met at Memramcook in November.

10.5 NEW PUBLICATIONS

Three new publications were prepared early in 1990 — Composting, Pruning Trees and Pruning Flowering Shrubs.

10.6 TELEPHONE CALL IN-SERVICE

A major portion of my time is spent on the telephone helping people with their garden problems. The problems vary with the season and usually affect more than one person. Certain questions are asked every year such as earwigs, ants and some diseases. The number of calls for the past few years have been steady, usually 2500 – 2700 per year. Table 10.1 indicates the number for the past four years:

Table 10.1: Numbers of Calls on Gardens Problems

	1987	1988	1989	1990
Kentville	2693	2731	2588	2643
Truro	1550	2277	1630	1691

Correspondence has decreased over the past few years but the number of calls and people coming into the office are steady.

10.7 NEWSLETTERS

There were 7 issues of the Home Garden newsletter. This is written specifically for the Agricultural Representatives and is intended to inform them of the many problems we are seeing, so that they can deal with them as the problem arises. The Newsletter is written weekly or bi-weekly as the need arises.

Chapter 11

ANNAPOLIS ROYAL HISTORIC GARDENS

Pat Pelham, Horticultural Advisor

11.1 OVERVIEW

The Annapolis Royal Historic Gardens were established in 1980–81 as part of a package of development.

The Gardens consist of 10 acres of upland, largely south facing hillside and 7 acres of reclaimed marsh on the Allain River. This reclaimed marsh is probably the oldest farmland in North America north of Florida.

The A.R.H.G. are composed of several smaller gardens which illustrate periods of local history (i.e. White Pine Forest, Acadian Garden, British Colonial Period Garden, Victorian Garden, etc.) together with ornamental areas. These ornamental areas are often composed of collections or at least feature specific types of plants. Examples are the Rose Garden, containing 200 varieties of roses, the Perennial Borders which feature 78 varieties of Herbacious Perennial, and the Ericacious Plant Area which is home to some 50 varieties.

It is intended that all areas combine attractive display with interesting plant material and act as an information resource for the gardening public.

11.2 DEVELOPMENTS

In 1990 the main thrust of development centered in the lower pond — the rock garden area itself was enlarged and improved through the addition of various new plants such as Aubrietias, Alchemillas, Brooms, Oxalis, etc. A bench insert was placed in this area for the relief of the weary; a new bench was received as a result of a gift from the Champlain Garden Club.

Nearby a hedge was constructed along the eastern boundary of the Gardens in two sections, one being of Firethorn (*Pyracantha*) and the other being of Spruce *(Picea)*. The material for the spruce hedge was generously donated by Bowater Mersey Co. Ltd. from their tree nursery stock.

In the Lower Pond System, existing beds were recut and enlarged so as to better harmonise with the ponds themselves. Plants added to this area in 1990 were mainly Herbacious Perennials, notably Daylilies *(Hemerocallis)* which form the main summer feature of this section. The number of different species and cultivars of Hemerocallis now stands at 62.

This year also saw the addition of a new bed of Bottlebrush Buckeye *(Aesculus parviflora)* a summer flowering shrubby cousin of the Horse Chestnut tree, as well as a fall planting of some 15 cultivars of Heather *(Calluna)*. New ornamental grasses were added to the grass collection which was further enlivened

through the addition of a dozen (12) cultivars of chrysanthemum received from Bev MacPhail at Kentville. Neighbouring beds were relined so as to produce more unity in this area.

Several interesting varieties were added to the Rose Garden, amongst which were the China Rose 'Old Blush', the gallica rose 'Camaieux' and the modern ground cover rose 'Bonica 82'. Approximately 120 plants were planted.

In 1990 it became obvious that a section of the main dyke had settled unacceptably. This section was repaired through the efforts of NSDA&M Extension with special effort on the part of Aboiteau Superintendent Bill Morley.

Some 52 different varieties of herbacious perennials were introduced to the garden in 1990 as were some 40 different varieties of woody perennial. Annual plants used amounted to some 13,000 individuals of 110 varieties.

11.3 ATTENDANCE

The attendance at the gardens for 1990 was 25,632.

Chapter 12

LAND USE PLANNING SECTION

By Mike Langman, Supervisor

12.1 OVERVIEW

The Land Use Planning Section of the Plant Industry Branch provides expertise and services in soil research, environmental issues, resource management, agricultural climatology, cartography and agricultural land use planning. In addition, the Section participates in agricultural extension programs thereby providing the agricultural industry with information and direction on matters relating to proper use and management of Nova Scotia's land and water resources.

A highlight of 1990 for the Land Use Planning Section was the automation of the Land Evaluation and Planning Service (LEAPS), through the acquisition of a Geographic Information System (GIS) computer. Consequently, a large part of Section staff activities were devoted to GIS hardware installation, system configuration, software development and staff training. Similarly, databases were loaded into the system and new map products were designed and tested. In addition, soil report products were improved and report production was computer automated. These developments have enhanced the production capabilities of the Section and will allow continued growth of the LEAPS program, as well as other geo-referenced products provided through the Department.

Section staff planned and participated in a number of extension type activities in 1990, targetted at increasing the understanding and awareness of provincial agricultural resources. Of particular significance among these activities were a Climate and Weather Workshop, a soil erosion and soil resource display at Crops Expo '90, and a fall tour of soil research projects in Cumberland and Colchester counties.

The following sections provide details on the activities of the Land Use Planning Section throughout 1990.

12.2 LAND EVALUATION AND PLANNING SERVICE(LEAPS)

The LEAPS program continued its growth and development in 1990, with the addition of eight new farms bringing the enrollment total to over sixty farms across the province. Many Section activities and initiatives in 1990 reflect the tasks associated with incorporation of the GIS computer into the LEAPS program, and the adaptation of existing services to the new technology.

12.2.1 Phase I

Phase I, the soil survey phase of the Land Evaluation and Planning Service (LEAPS), surveyed approximately 822 hectares of land in 1990. In addition, the LEAPS program offered an "update-survey" service for the first

time last year. This service allows farms already enrolled in the Service, to have additonal lands purchased or rented since their original survey, added to the LEAPS data base for a nominal charge. Seven farms requested update-surveys in 1990 covering a total of 235 hectares.

In addition to the farm surveys, Section staff also surveyed approximately 85 hectares of land around the Liverpool Airport for the Liverpool Queens Development Commission.

12.2.2 Phase II

Phase II, the interpretation and recommendation component of LEAPS, continued its service to client farmers producing recommendations for the 11 farms surveyed in 1989, and meeting with the 1990 client farmers in order to determine their Phase II requirements. In total, 51 fertilizer and lime recommendations, 10 drainage strategies, 9 deep tillage strategies, 6 land clearing strategies, 8 dairy herd feed requirement calculations, and 10 crop rotation plans, were delivered in 1990. Recommendations were delivered in both a co-ordinated report with appendices of relevant government publications and in map format.

The "Fertilizer Expert" software developed in 1989, continued to gain popularity with agronomy and extension staff in 1990. It is anticipated that in the near future the majority of fertilizer recommendations provided through the Department will be produced using this technology.

In 1989, an ALFI project was approved which enabled the hiring of a Computer Programmer to develop an improved crop rotation planner and manure management planner software. The crop rotation planner software developed by the programmer is operational and has proven to be a useful crop planning tool.The manure management planner software will be available in 1991 for testing.

The LEAPS program has provided farmers with high quality land management tools including field boundary maps and soil maps. In addition, the Service has spawned the development of numerous recommendation and interpretation products based on the resource inventory. These interpretive products have significantly enhanced the consistency, scope and timeliness of recommendations provided to farmers enrolled in the LEAPS program. Furthermore, these advances provide potential spin-off benefit for non-LEAPS farmers within the province.

12.3 CARTOGRAPHIC LABORATORY

In 1990, the cartographic laboratory took on a new high-tech appearance with the installation of an ESRI ARC/INFO Geographic Information System computer. The GIS hardware includes a VAX 3800 minicomputer linked to three, 19" graphics terminals through an ethernet linkage. Two Tektronix 4211 terminals with Altek digitising tables perform as data entry work stations, and a Tektronix XN11 terminal is used as a data query and analysis station. Hard copy map products are produced using a Calcomp model 1025, cut-sheet, four colour pen plotter.

Cartographic accomplishments in 1990 include the:

- conversion of hard copy products to digital format. This process included the digitisation of approximately 60 map bases in house, and adapting digital map bases supplied through LRIS-Summerside to the system configuration.
- development of standard computer map templates, logos and map surrounds for both soils and field boundary map products.
- computerisation of a map library containing farm field and base map coverage information.
- development of a software interface for the addition of maps to the library, and for adding coverages to map sheets.
- development of a provincial reference map for products available in standard digital base scales.

12.4 LAND USE PLANNING

The land use planning component of the Section provides technical expertise on issues of land use planning, land information and resource management. In addition, the Section represents the Department of Agriculture and Marketing on interdepartmental committees whose mandate it is to review and make recommendations on land use concerns. Similarly, the Section provides technical input to the Department on provincial and national environmental issues such as the Green Plan, the Environmental Impact Assessement process and the Round Table on Environment and the Economy.

12.4.1 Nova Scotia Land Use Policy Committee

The Nova Scotia Land Use Policy Committee (LUPC) is charged with providing advice to cabinet on land use issues. The Working Group of the LUPC has established committees and issue groups to address specific topics of land use policy in Nova Scotia. The Land Use Planning Section represents the Department of Agriculture and Marketing on a number of committees established by the Working Group. During the past year the Working Group received and reviewed reports on land use issues submitted from active Issue Groups.

Water Resources Management Issue Group

The mandate of this Group is to review water resource management in the province, and propose programs to ensure the protection and management of water resources. In 1990 the Group completed and released a brochure entitled "Water , Water, EveryWhere...?" designed to protect the municipal water supply in Nova Scotia.

Land Information Committee

The Land Information Committee is primarily concerned with establishing and coordinating a provincial land information management system which will respond to present and future land information needs. Over the past year, the committee organised, and sponsored the Geomatics 1990 Conference. The Committee also developed a proposal and received approval for impementing a "Land Information Standards Study and Data Audit for the Province of Nova Scotia".

The Property Mapping Sub-committee prepared a draft document entitled "Property Records Information Management Policy" to facilitate the completion of conventional property mapping and parcel indexing in the province.

The Base Mapping Sub-committee developed a revised priority area list of base mapping requests for urban and rural mapping, and prepared a recommendation to establish a digital map library in the province.

Soil and Water Conservation Issue Group

The main objective of the Soil and Water Conservation Issue Group is to review existing and potential soil and water conservation problems, and to make recommendations on mitigative measures that reduce land and water degradation. During 1990 the Issue Group completed a draft background document on soil conservation entitled "Soil Conservation Issues-Background Paper". The Issue Group also sought and obtained input to the Environmental Impact Assessment (EIA) process through the Department as lead agency, in order to ensure that soil resource concerns were considered during project evaluations.

12.5 National SOIL CONSERVATION PROGRAM

In April, 1990 the Canada-Nova Scotia Agreement on Soil Conservation was signed providing $1 million over the next four years for soil resource management and conservation initiatives within Nova Scotia. The Section represents the Department in the implementation of the four sub-programs under the Agreement;

- The Soil Conservation Awareness and Evaluation Program
- The Soil Conservation Technology Adaptation Program
- The Soil Conservation Monitoring Program
- The Agricultural Streambank Conservation Program

All programs became operational in 1990, and by years end provincial and federal implementation committees had reviewed and provided recommendations to the Program Management Committee on a number of projects.

12.6 NOVA SCOTIA SOILS INSTITUTE

On January 26, 1986 the Minister of Agriculture and Marketing, the Honourable Roger Bacon announced the formal authorisation of the Nova Scotia Soils Institute together with the appointment of its initial membership. The Institute was established by the Nova Scotia Department of Agriculture and Marketing for the purpose of co-ordinating and conducting investigative studies of soils in the province. The ultimate objective of the Institute is to serve to enhance our understanding of the soil resources of the province, including capabilities and limitations. Increased understanding is believed to be a critical step towards achieving improvements in soil resource management.

The major activities of the Institute in 1990 included:

- sponsorship of an "On-Farm Soil Survey Workshop" for researchers, extension staff and farmers from across the Atlantic provinces. Attendance totalled approximately 35 individuals for the two day workshop.
- development of a NSSI brochure which was distributed at functions in which NSSI had involvement in 1990.
- preparation of an Agro-forestry Symposium proposal to be be held in the Fall of 1991.
- formalization of contacts with the Crop Development Institute in 1990, with each Institute having a non-voting representative sitting on the others executive.
- sponsorship of a fall tour of soil research projects in Colchester and Cumberland counties.

The Institute continued to review and evaluate proposed projects in order to determine their relevance to research priority strategies. The Institute also provided technical and management support for projects as requested in 1990. Projects reviewed by the Institute or supported in the past year, included:

- Soil Moisture Modelling - R. Gordon
- Evaluation of Subsoiling on Forage and Cereal Grains - D. Holmstrom
- Soil Compaction on Blueberry Yields - D. Holmstrom
- Subsurface Drainage Performance - A. Madani

12.7 AGRICULTURAL CLIMATOLOGY

Robert Gordon, the provincial agricultural climatologist, was on educational leave to Guelph University for part of 1990, and will return to the Department in 1991.

Table 12.1: Temp, Ppn't, Degree-days and Sunshine at Kentville CDA, 1990
Temperatures (°C), Degree-days, Precipitation (mm) and Sunshine (hr)
Canadian Department of Agriculture Experimental Farm
Kentville, Nova Scotia
1990

Temp	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
High °C	17.0	14.0	18.5	26.0	28.0	29.5	32.5	31.5	27.5	26.0	19.0	16.5
Low °C	-16.0	-23.5	-19.5	-4.0	-1.0	5.0	8.0	7.0	3.0	-2.0	-8.0	-12.5
Mean °C	-1.8	-4.2	-0.4	6.1	9.4	17.3	20.6	20.5	14. 5	11.8	4.3	0.6
Degree Days 5°C												
Actual	5.2	8.2	10.2	58.8	138.2	369.0	482.6	470 .9	265.6	213.7	32.5	20.3
Normal	1.0	1.0	5.0	34.0	169.0	326.0	439.0	416.0	278.0	138.0	40.0	7.0
Precipitation												
Actual mm	97.3	141.6	66.8	141.5	198.4	31.0	79.2	31. 8	88.2	126.8	120.0	163.8
Normal mm	135.6	106.8	98.6	82.6	77.3	71.2	70.2	98.1	88.5	101.9	119.4	130.3
Bright Sunshine												
Actual hr	79.1	102.1	187.1	141.3	163.9	228.5	237.4	265 .7	168.0	112.5	71.8	64.8
Normal hr	73.2	97.8	128.4	152.1	201.5	217.0	239.3	224.9	174.8	139.3	80.5	55.7

12.7.1 The Growing Season

The growing season started poorly in Nova Scotia with April receiving approximately 80% more precipitation than normal. This trend continued into May as most regions in the province received over 175 mm of rain which is more than twice the 30 year normal. The May average temperatures were about 1°C below normal and the hours of sunshine were down 20% from normal, this combined with the high amounts of rainfall resulted in poor field working conditions for the spring.

Precipitation totals for the month of June were quite variable as they ranged from 68% above normal to 56% below normal. Average temperatures for June were 1°C above normal and increased the seasonal heat units to around normal for that time of the season.

July continued with above average temperatures while minimal rainfall in the first half of the month resulted in below normal precipitation totals.

Drought-like conditons occurred in many locations throughout the province in August as the average temperatures were 2°C to 4°C above normal and rainfall amounts were down substantually in most parts of the province. Seasonal heat units were up by as much as 20% at some locations for that time of the season.

September brought more above average temperatures and approximately normal rainfall amounts to the province.

Precipitation totals for the month of October ranged from 9% above normal to 99% above normal. In maintaining the summertime trend the average temperatures were 2°C to 3°C above normal. The above average temperatures and generally cloudy conditions resulted in the first fall frost occurring about two weeks later than normal.

Detailed monthly weather statistics for the season are presented in Tables 12.1, 12.2, 12.3. Departures from the normal precipitation and temperature can be found in Table 12.4.

12.8 MISCELLANEOUS COMMITTEE ACTIVITIES

Section staff contributed to a wide range of provincial, regional and national committees in 1990. The following is a listing of those committees, and a brief summary of their activities.

Table 12.2: Temp, Degree-days, Ppn't, Sunshine for Nappan

Temperatures (°C), Degree-days, Precipitation (mm) and Sunshine (hr)
Canadian Department of Agriculture Experimental Farm
Nappan, Nova Scotia
1990

Temp	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
High °C	16.0	10.0	18.0	19.0	22.5	27.0	29.0	29.5	25.5	23.0	16.5	16.5
Low °C	-20.5	-31.0	-26.0	-6.0	-3.0	0.5	5.0	4.0	1.0	-3.0	-5.0	-18.5
Mean °C	-3.5	-7.3	-2.4	4.2	8.4	15.9	18.8	19.4	13. 3	10.8	3.0	-1.1
Degree Days 5°C												
Actual	3.5	0.0	5.7	29.1	110.9	326.2	428.1	446.4	249.5	183.3	18.1	8.7
Normal	0	1.0	3.0	21.0	136.0	290.0	402.0	384.0	251.0	116.0	32.0	5.0
Precipitation												
Actual mm	129.2	104.8	62.0	138.7	238.4	41.4	113.0	101 .1	105.5	161.3	128.7	312.3
Normal mm	113.9	88.9	89.8	75.3	75.8	78.3	84.4	91.1	81.2	101.4	108.0	51.1
Bright Sunshine												
Actual hr	83.5	96.5	193.5	125.1	168.4	225.7	231.0	268.6	174.3	89.7	66.2	71.1
Normal hr	89.2	109.6	125.8	149.3	193.6	209.3	231.8	212.8	162.5	131.1	83.6	74.3

Table 12.3: Temp, Degree-days, Ppn't, Sunshine for Truro

Temperatures (°C), Degree-days, Precipitation (mm) and Sunshine (hr)
Nova Scotia Agricultural College
Truro, Nova Scotia
1990

Temp.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
High °C	13.5	9.5	14.0	18.5	24.5	29.0	31.0	32.5	27.0	24.0	16.0	14.0
Low °C	-18.5	-27.0	-23.5	-6.0	-1.5	5.5	5.5	8.0	0.5	-0. 5	-6.5	-18.5
Mean °C	-3.4	-7.4	-2.8	4.6	9.4	17.7	19.8	21.2	14.2	10.7	3.7	-0.8
Degree Days 5°C												
Actual	2.5	0.0	2.9	39.7	141.2	380.0	459.1	502.6	276.3	179.8	27.0	10.2
Normal	1.0	1.0	4.0	17.0	123.5	274.2	399.8	377.2	239.4	106.4	33.0	5.8
Precipitation												
Actual mm	116.0	67.6	64.8	141.5	157.5	59.5	65.2	65.5	96.2	169.4	144.7	122.5
Normal mm	106.0	89.1	91.5	79.9	87.8	60.0	91.5	96.1	75.8	110.3	116.4	133.7
Bright Sunshine												
Actual hr	68.3	97.3	151.2	122.8	135.4	212.2	183.3	237.1	136.0	73.8	56.0	42.4
Normal hr	87.7	107.9	126.2	149.9	196.1	218.1	224.4	212.2	154.5	128.4	84.2	69.7

Table 12.4: Average Temp. and Total Ppn't Departures From Normal, 1990

Average Temperatures (°C) and Total Precipitation (%)
Departures From Normal During 1990

Locati	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Truro T (°C)	+3.4	+0.2	-0.5	+1.7	+0.6	+3.3	2.0	+4.1	+1.8	+2.9	+0.8	+2.9
P(%)	+9.0	-24.0	-29.0	+77.0	+79.0	0	-29.0	+32.0	+27.0	+ 54.0	+24.0	-8.0
Yar T(°C)	+2.3	-0.2	-0.1	+0.3	-0.5	+0.8	+1.1	+2.4	+0.7	+1.6	-0.1	+2.2
P (%)	-7.0	-10.0	-55.0	+31.0	+104.0	+54.0	-87.0	-91.0	- 8.0	+9.0	-28.0	+1.0
Green T (°C)	+2.9	-0.7	+0.2	+0.9	-1.1	+1.6	+1.3	+1.8	-0.3	+2.4	+0.4	+3.1
P(%)	-25.0	+62.0	-23.0	+102.0	+153.0	-13.0	+18.0	-28.0	-23.0	+20.0	+24.0	+54.0
Kent T (°C)	+3.2	+1.0	+0.6	+1.7	-1.0	+1.4	+1.4	+2.1	+0.2	+2.7	+0.3	+3.0
P (%)	-28.0	+32.0	-32.0	+71.0	+157.0	-56.0	+13.0	-68.0	-35.0	+24.0	+1.0	+26.0
Nap T (°C)	+3.3	-0.4	-0.1	+0.9	-0.8	+1.2	+0.8	+2.0	-0.1	+2.5	0	+2.9
P (%)	+13.0	+18.0	-31.0	+84.0	+214.0	-47.0	+34.0	+11.0	+ 30.0	+59.0	+19.0	+163.0
Syd T (°C)	+0.3	-3.2	-2.1	+1.0	-1.5	+1.5	+0.2	+2.2	+0.2	+2.1	+0.1	+1.6
P (%)	+2.0	-15.0	-58.0	+60.0	+112.0	+13.0	-40.0	-38.0	+ 75.0	+43.0	-18.0	+86.0
M. Musq T (°C)	+2.4	-0.1	-0.8	+0.9	-1.1	+1.5	+0.6	+2.6	+0. 7	+2.5	-0.1	+2.4
P (%)	-16.0	-25.0	-40.0	+88.0	+52.0	+68.0	0	-27.0	+4.0	+ 44.0	-2.0	+54.0
Hfx T (°C)	+4.2	+0.5	+0.3	+1.3	-1.1	-0.2	+0.8	+1.4	+0.9	+2.4	+1.1	+3.7
P (%)	-15.0	+11.0	-48.0	+80.0	+39.0	+19.0	-34.0	-50.0	+ 4.0	+10.0	-13.0	+40.0
Ant T (°C)	+0.9	-1.8	-1.3	+0.8	-1.6	+1.7	+0.2	+3.3	+0.5	+2.9	+0.9	+2.4
P (%)	-9.0	-39.0	-43.0	+126.0	+96.0	+18.0	-35.0	+14.0	+ 32.0	+99.0	-10.0	+94.0
Bwtr T (°C)	+3.5	0	+0.3	+1.0	-1.1	+1.2	+1.2	+2.0	+0.4	+2.3	+0.8	+2.8
P (%)	-30.0	+8.0	-24.0	+53.0	+110.0	+22.0	-15.0	-61.0	+15.0	+3.0	+29.0	+32.0

12.8.1 National Soil Conservation Awareness Task Group

The Awareness Task Group, comprised of representatives from each province as well as federal representation, is charged with coordinating a national soil conservation awareness campaign. The National Soil Conservation Awareness Task Group met once in 1990 to review their mandate and to initiate the coordination of preparations for a revamped Soil Conservation Awareness Week as part of the initial efforts under the new mandate.

12.8.2 Atlantic Committee on Soil and Climate (ACSC)

The Atlantic Committee on Soil and Climate met in 1990 to discuss issues of regional concern pertaining to soil and climate extension research. The main activities of the Committee were to review discussion papers prepared by subcommittees struck by the ACSC to address specific issues.

12.8.3 Atlantic Advisory Committee on Agrometeorology

The Atlantic Advisory Committee on Agrometeorology which is chaired by Section staff met in August. Projects initiated in 1990 included a risk analysis of growing degree days in the Atlantic Provinces, heat units for corn in the Maritime Provinces and winter hardiness zonation mapping.

12.8.4 Nova Scotia Climate Advisory Committee

The Nova Scotia Climate Advisory Committee met twice in 1990. At these meetings activites focussed on organizing and implementing climate related workshops having a variety of theme topics.

Nova Scotia Climate Advisory Workshop Sub-committee

R. Gordon conducted a workshop on the "Application of Climate and Weather Information to the Farm" in late January, 1990. Another workshop is being planned for 1991.

12.8.5 National Expert Committee on Agrometeorology

The committee met in Downsview, Ontario and included representation from most provinces. The committee planned a symposium-workshop on the implications of climatic change and climatic variability on agriculture in Canada.

12.9 CONFERENCES AND WORKSHOPS

The following is a listing of the conferences and workshops attended by section staff in 1990.

- Agricultural Institute of Canada Annual Conference, Penticton, B.C.
- Application of Climate Information to the Farm, Truro, N.S.
- U.S.D.A. Soil Conservation Workshop, New Hampshire, U.S.A.
- Innovation in the Agri-Food Processing Industry, Wolfville, N.S.
- On-Farm Soil Surveys: A Tool for Resource Based Farm Planning, Truro
- GIS' 90 Conference, Ottawa, Ont.
- Agricultural Land Use Systems Mapping Workshop, Winnipeg, Man.
- Geomatics Conference, Halifax, N.S.

12.10 EXTENSION ACTIVITIES

Section staff contributed to a diverse selection of extension activities over the past year. The following is a brief summary of those extension activities;

12.10.1 Plant Industry Branch Video

D. Moerman organized the preparation of a promotional slide show/video including text and visuals for the Plant Industry Branch.

12.10.2 Agrometeorolgy (MP 330)

R. Gordon and S. Smith (Math and Physics Department of the Nova Scotia Agricultural College) presented a course to third and fourth year degree students in Agrometerology.

12.10.3 Computers in Agriculture Course

Section staff organized a course entitled "Computer Applications for Farmers" in co-operation with the NSAC.

12.10.4 LEAPS Display

Section staff prepared a LEAPS display for use at exhibitions and fairs to promote the services provided through LEAPS.

12.10.5 Agricultural Weather Summaries

With a mailing list of approximately 200 farmers, researchers and extension persons, the Agricultural Weather Summaries were continued throughout 1989 on a weekly basis during the "growing season" and on a monthly basis during the winter months. The weather summaries from 13 locations around Nova Scotia and Prince Edward Island include data such as average temperature, degree-days, corn heat units and hours of bright sunshine.

12.10.6 Rainfall Erosion Demonstration

Section staff assisted in the preparation of the Plant Industry Branch contribution to the NSAC "Open House", and conducted a rainfall erosion simulation demonstration.

12.10.7 Agriculture and Environment Symposium

M. Langman gave a presentation to the Nova Scotia Institute of Agrologists on the importance of environmental issues to the agriculture industry.

12.10.8 Crops Expo 90

Section staff coordinated the preparation of a Branch booth and display site for Crops Expo 90 which was held at Sheffield Mills in July of 1990. In addition, Staff designed and operated a "Soil Profile Pit", and "Rainfall Erosion Demonstration" during the two day field exposition.

12.10.9 Soils Short Course

A soils course was offered to Department of Health Engineers in 1990 with a day classroom lectures followed by a field trip to observe soil features and to discuss site selection techniques.

12.11 RESEARCH PROJECTS PARTICIPATION

Section staff conducted a number of applied and pure research projects on climate, soil, water and integrated investigations for agricultural applications.

- Temperature Inversion Measurement
- Erosion Risk Potential
- Automatic Weather Station for Grape Growers
- Automatic Weather Station for Department Use
- Irrigation Scheduling
- Wind Fans For Frost Protection
- Recent Trends in the Length of the Growing Season
- Climatic Variability and Potato Production
- Nova Scotia Well Water Quality Assurance Study
- Kings County Well Water Time Study
- Evaluation of Subsoiling on Forage and Cereal Grains
- Effect of Rolling on Soil Compaction and Blueberry Yields
- Subsurface Drainage Performances on a Shallow Slowly Permeable Nova Scotia Soil
- Educational Packages Inventory (in preparation)

Chapter 13

WEED SCIENCE SERVICES

By Doug Doohan, Supervisor

13.1 OVERVIEW

Extremely wet weather during April and May delayed the planting of most horticultural and field crops. June brought a complete turn-around with generally hot, dry weather persisting into early fall. Overall, acceptable weed control was experienced in most crops in 1990. Herbicide performed adequately except where lack of rainfall, after application, prevented activation of preemergence treatments. Weed control was augmented by the dry weather in some situations. Dry weather, following planting, inhibited the germination of many weed species; whereas, deep-seeded crops found enough moisture to germinate and emerge. When rain finally arrived in sufficient quantity to germinate weed seeds, the crop canopies were often far enough advanced to suppress the weed seedlings.

13.1.1 Cereals

Scentless chamomile continues to spread across the province, especially in winter wheat and carrot fields. Buctril M is the only herbicide that can be used to control scentless chamomile in cereals in the fall. Refine and Target provide excellent control in spring cereals when applied prior to the 4 to 6 leaf stage of the weed. Crop tolerance problems (chlorosis and stunting) with Refine, such as reported last year, were not as widespread or severe in 1990.

Wild oat populations were not as bad in 1990, possibly due to late planting. Growers have not made any significant effort to control wild oats.

13.1.2 Corn

Weed control appears to be improving in this crop. More growers are aware of their problems with triazine resistant broadleaf weeds and are better planning their control measures. Control of annual grasses continues to be a problem for a few farmers. These grasses can be controlled with carefully timed postemergence herbicide treatments.

13.1.3 Pastures

Pasture constitutes a major use of agricultural land in Nova Scotia. Pastures may or may not be managed intensively. Research conducted by Weed Science Services and Agronomy staff indicate that significant improvement can be made in pasture yield and quality through the integrated use of appropriate forage species, site preparation, weed control, fertility and grazing management.

Municipal inspectors under the Weed Control Act have worked closely with researchers from the Nova Scotia Agricultural College and Agriculture Canada in evaluating a number of biological controls on pasture weeds. This promising area of work will accelerate during 1991 with major initiatives on a number of poisonous pasture weeds; including, tansy ragwort and St. John's wort.

13.1.4 Vegetables

Weed control in most vegetable crops relies on an integration of tillage and herbicides. Generally, new herbicides are not being developed for use on horticultural crops because of the relatively small market potential. Additionally, over the past ten years several herbicides recommended for use on vegetables have been removed from the market for various reasons. As a result of this attrition, herbicides are no longer the primary method of weed control in a number of crops. Chemical weed control has been replaced or increasingly augmented by increased cultivation and hand-weeding. Frequently, perceived benefits resulting from decreased herbicide use have been off-set by negative environmental effects of tillage such as destruction of soil texture and increased erosion.

Presently, there are major weed control problems being experienced in carrots, cole crops, peas and beans. Scentless chamomile and goldenrod are major problems in carrot production. Both species are inadequately controlled by the major herbicide linuron and are tolerant of tillage and site preparation methods. There are no herbicides registered for use on cole crops that will provide acceptable, broad-spectrum, weed control. Dinoseb, which is the major herbicide used for weed control in beans and peas, will be removed from the market as soon as a safe and effective alternate can be found. These problems are all currently being addressed in research programs conducted by Weed Science Services; however, there are relatively few new experimental herbicides being developed for use on these crops. Future research should include more competition studies which would facilitate an integrated weed management approach with potentially reduced dependence on herbicides.

13.1.5 Fruit Crops

Velpar is the principal herbicide used for weed control in lowbush blueberries. A number of perennial weeds including, bunchberry, yellow loosestrife, trailing blackberry, wild rose and barrenberry tolerate Velpar and are increasing in distribution and density. Controls for Velpar resistant weeds are being developed through a cooperative program involving Agriculture Canada, NSAC and the blueberry industry.

Sampson et al. (Professor at NSAC) released an identification manual for weeds growing in blueberry fields which should be quite helpful to growers and crop advisors.

Weed control in strawberries depends on integration of tillage and herbcides. Good control can be maintained provided perennial weeds are eradicated prior to planting and weed control treatments of tillage and/or herbicides are applied in a timely fashion. Maintenance of optimum crop growing conditions and plantation sanitation are critical to preventing weed invasions. Creeping buttercup appears to be the major weed problem that is not being adequately controlled at this time.

Tufted vetch continues to be a problem in orchards. Rough bedstraw (cleavers) appears to be increasing in orchards as well. Repeated use of simasine year after year in certain orchards has resulted in the development of a flora of resistant broadleaf weeds under the trees. Alternative herbicides to simasine are available but growers will need to be educated regarding their use.

13.1.6 Forages

The lack of acceptable weed control methods is a serious obstacle to continued development of improved forage plantings in Nova Scotia. Forage crops are not amenable to post-planting tillage and there are no herbicides that will control the broad spectrum of weeds occuring in forages. Weed control in forage crops in Nova Scotia is further complicated by the high frequency of farms on which forages are the only crop; therefore, crop rotation does not provide an opportunity for weed control.

Problems with smooth bedstraw and coltsfoot continue to increase in Nova Scotia. Coltsfoot is spreading from roadsides into hay fields and pastures. There were increased problems with wild carrot and round-leaved mallow in forages in 1990. Corn spurry is a serious weed problem in many newly planted fields of alfalfa.

13.2 EXTENSION SERVICES

Extension calls to growers were handled by District Weed Inspector, Mr. John Thomson, Weed Technologist, Mr. Keith Silver and Weed Project Coordinator, Ms. Lise LeBlanc. Inquiries regarding lowbush blueberries were the responsibility of John Thomson. Lise LeBlanc was responsible for inquiries concerning cereal and forage crops while Keith Silver dealt with problems in the other horticultural crops and field corn.

Operation Spraycheck, a sprayer calibration program, was available in the 1990 growing season. Sixty sprayers were calibrated on-farm during the summer. Operation Spraycheck was promoted at various Soil and Crop Improvement Association meetings, radio interviews and articles in the Farm Focus and newsletters.

Two factsheets were published, in cooperation with Extension Engineering, entitled "Choosing the Proper Nozzle for Your Spraying System" and "Field Sprayer Calibration".

Weed booths were set up at two exhibitions: Truro and Windsor. They provided excellent opportunities to exhibit live weed species, pesticide safety equipment and information as well as photo displays on current research.

Several demonstrations of weed control methods and weed identification were conducted at the Field Crops Expo'90, which was a major three day exposition and conference emphasising farm self-sufficiency and profitability in forage, cereal and protein crops. Demonstrations included fall control of quackgrass, herbicide selectivity, economic thresholds of several weed species and tolerance of alfalfa, clover and timothy to atrazine residues in the soil. Additionally, a weed garden consisting of 56 species was displayed.

Weed Science Services staff coordinated or participated in the following extension training opportunities in 1989.

- Pictou County Soils & Crops Day
- Soils & Crops Symposium (Kentville)
- Cereal and Vegetable Update (Great Village)
- Halifax County Soils & Crops Day
- Turfgrass Short Course
- Weed Inspector Annual Meeting
- N.B. Weed Tour
- Landscapers Certification Program
- NSDAM Staff Conference
- Cereal Information Day (Amherst)
- Principles of Weed Control Course (NSAC)
- Blueberry Producers Twilight Meetings
- Nova Scotia Fruit Growers Association Annual Tour

Throughout the growing season, staff responded to approximately 600 request for information on weeds and their control. This included farm calls, letters, telephone calls and office visits. Approximately 1000 copies of the Guide to Weed Control were distributed throughout the province. Several articles dealing with weeds, weed control and the safe use of pesticides were prepared for crop newsletters, newspapers and the Agrogram.

13.3 WEED SCIENCE RESEARCH

13.3.1 Vegetables

Trials were conducted on processing peas and snapbeans in search of a replacement for dinoseb for the control of broadleaf weeds. Though some treatments gave weed control results as good as or better than dinoseb, none showed the same degree of crop safety.

13.3.2 Cereals

Trials were conducted to determine the best fall herbicide treatment for scentless chamomile control. Treatments that provided good control in previous trials were re-evaluated. Refine, Target, Kilmor, Buctril M and Estaprop all provided excellent long term control into the next growing season. Buctril M is currently the only treatment registered for fall application.

Two trials wre conducted in barley and spring wheat to determine crop injury and yield loss when applied at different crop growth stages. Herbicides were applied at Zadox:12 (2 leaf), 23 (3 tillers) and 32 (2 nodes). Barley sprayed at Zadox:32 showed a marked decrease in height and/or yield. Target and Dyvel reduced the yield by almost a tonne per hectare, while Kilmor and Refine reduced the yield by nearly 0.5 tonne per hectare. 2,4-D affected crop height and reduced the yield by 0.5 tonne per hectare at early crop growth (Zadox:12). Spring wheat sprayed with MCPA and 2,4-D at Zadox:12 continued to show crop injury throughout the growing season. These treatments decreased the yield by 0.5 tonne per hectare at Zadox:23. At Zadox:32, wheat was slightly stunted and yellowed and remained this way for the rest of the season. Target and Kilmor decreased the yield by 0.5 tonne per hectare.

Trials were conducted in barley and spring wheat for wild oat control. Wild oats can be difficult to control because of weed longevity and post-harvest shattering. Wild oats did not grow well this season due to a wet spring, which delayed planting. After planting, the season was very dry which is not good germinating conditions for wild oats.

13.3.3 Corn

Four corn trials were conducted in 1990; for annual grass control and triazine resistant lambquarters. Atrazine applied preemergence at 1.00 kg/ha followed by Buctril M applied late postemergence at 0.56 kg/ha provided the best broad- spectrum weed control at a reasonable cost of $20.12 per hectare. Other broad- spectrum treatments were in the $50 per hectare price range.

13.3.4 Strawberries

Several trials were conducted to evaluate herbicide treatments for a number of serious perennial weeds occurring in strawberry fields. A significant discovery was the good control of creeping buttercup and grass-leaved stitchwort with preemergence or early postemergence applications of the recommended herbicide Devrinol.

13.3.5 Blueberries

Trials were conducted at Sunnybrae, Pictou County and at Parrsboro to evaluate high rates of atrazine on yellow loosestrife, bunchberry, teaberry and St. John's wort. As of late summer there was no indication that atrazine was effective on these weeds. However, some growers claim to have had success with these treatments.

13.3.6 Apple Orchards

In our continuing trial on newly planted apple orchard, terbacil continues to provide surprisingly good suppression of quackgrass and tufted vetch. There is also an indication that oxadiazon is suppressing vetch. Simazine gives very poor results on quackgrass and vetch. Increased tree growth (height and caliper) was evident on plots treated with terbacil.

13.3.7 Forages

An integrated pasture management system was set up in 1988 to demonstrate improve weed control and pasture productivity. Half of a 12 hectare field was sprayed with Roundup (3 L/ha) in the fall of 1988. The following season a mixture of orchardgrass, meadow fescue and white clover was direct seeded. Half of the Roundup treatment and half of the control treatment was sprayed with Tropotox-Plus (4.25 L/ha). The pasture was forward strip grazed. Forage quality and yield and weed control was measured throughout the growing season. In 1989, differences were not apparent. The Roundup and Tropotox Plus combination provided the best overall weed control. In 1990, differences were apparent in July. The non-Roundup treatments had higher yields due to a high quackgrass population. Although yields were high, the treatment also had lower protein and energy content than the control treatments. By the end of the season the treatments treated with Roundup had higher yields due to quackgrass senescing. Dandelion control was excellent in the Tropotox-Plus treatments.

A trial was conducted in barley underseeded to forages. Several recommended and non-recommended herbicides were applied at two growth stages. The first was at Zadox:14 for barley and the first trifoliate for forages. The second was at Zadox:24 for barley and the third trifoliate for forages (crop canopy). Grain yields were taken with the highest yield attributed to the Embutox, Embutox + MCPA and Target treatments. This may have been due to the treatments decreasing forage vigor when the cereal was at its critical growing period. Forage quality and yield will be determined in 1991.

13.4 EXPERT COMMITTEE ON WEEDS

Thirty-two research abstracts were published in the research report on work conducted by Weed Science Services in horticultural crops cereals and forages.

13.5 REPRESENTATION

Weed Science Services Staff represented the Nova Scotia Department of Agriculture and Marketing in the following organizations:

13.5.1 Expert Committee on Weeds — E.C.W.

The E.C.W. (Eastern Section) is the working committee responsible for the testing and recommendation of weed control methods for Eastern Canada. Staff were very active in the work of this committee, particularly in promoting research and development of weed control methods of value to Nova Scotia agriculture. The E.C.W. reports directly to the Canadian Committee on Crop Production Services therefore this representation had provided the opportunity to effectively communicate regional weed research and extension needs.

13.5.2 Canadian Association of Pesticide Control Officials — CAPCO

The Department was represented at the bi-annual meetings of CAPCO. The federal regulatory bodies rely heavily on CAPCO for input on the regulatory and policy needs of the provinces. CAPCO is working actively through its various committees on the subjects of certification and training of applicators, safety apparel,

pesticide container disposal, groundwater issues and regulatory affairs. CAPCO provides the opportunity for information exchange and provincial input to regulatory policy and decisions.

13.5.3 Atlantic Crops Committee — ACC

Weed Science Services Staff are active in the following ACC committees:

- Atlantic Committee on Pest Management
- Atlantic Weed Science Sub-Committee
- Atlantic Berry Crops Committee
- Atlantic Greenhouse and Ornamentals Committee
- Atlantic Vegetable Committee
- Atlantic Cereal Crops Committee

Staff regularly cooperate in the preparation of ACC publications.

13.5.4 Atlantic Vegetation Management Committee

The District Weed Inspector is the Departments official member of AVMA. AVMA provides opportunity for technical information exchange, public relations and development of policy statement of interest to vegetation management specialists and regulators. Activities conducted under the Weed Control Act fall within the aegis of the Association.

Staff are members of and serve on committees of the Weed Science Sociey of America, the European Weed Research Society and the Canadian Pest Management Society.

13.6 WEED CONTROL ACT

This legislation has supported the control of many weeds that are detrimental of food production in Nova Scotia. The legislation is designed mainly to protect agricultural lands but also provides legislation whereby poisonous weeds are subject to strict control measures.

The Act encourages the appointment of various Municipal Weed Inspectors as noted in Table 13.1.

Total costs for this year amounted to approximately $130,000.00. This includes Sections 7, 8 and 9 of the Regulations to the Weed Control Act as well as costs involved under weed control along riverbanks.

Two meetings of the Weed Inspectors were held this year; one the last week of April and one in the fall when Inspectors reported on their work for the year. During the spring meeting, Inspectors were updated on Regulations, Safety, Application Techniques, Weed Identification, Control Methods, etc. The fall meeting provided the opportunity for each inspector to relate the activities of the year.

Muncipal weed inspectors continue to cooperate with Agriculture Canada and NSAC scientists on biological control of poisonous pasture weeds using insects and plant pathogens.

13.6.1 Weed Inspector Working Group

A Working Group of Municipal and Provincial Weed Inspectors was struck at the fall meeting. The purpose of this Working Group was to evaluate current programs operated under the Weed Control Act and to make recommendations regarding future programs relative to the Act. This Committee will meet on a monthly basis during 1991 in fullfilling its mandate. The Committee's recommendations would then be forwarded for consideration by the Weed Advisory Committee of the province.

Table 13.1: Municipal Weed Inspectors Appointed Under the Nova Scotia Weed Control Act

COUNTY	INSPECTOR	MAILING LIST	CODE
Annapolis	VAN ROESTEL, Pam	RR #1 Bridgetown	B0S 1C0
Antigonish	VAN OIRSCHOT, Joe	RR #2 Antigonish	B2G 2K9
Argyle	MUISE, James	P.O. Box 191, Tusket	B0W 3M0
Cape Breton	MACKENZIE, D. Rodney	283 Coxheath Rd, Sydney	B1R 1R8
Colchester	VAN OIRSCOT, Tom	RR #6, Truro	B2N 5B4
Cumberland	MCMASTERS, Bruce	RR #1 Collingwood	B0M 1E0
Digby	WARNER, LeRoy	RR #1 Barton	B0W 1H0
Halifax	HULL, Brian	RR #1 Shubenacadie	B0N 2Y0
Hants East	SAUNDERS, Gordon	RR #1 Elmsdale	B0N 1M0
Hants West	CURRY, Traci L.	RR #2 Falmouth	B0P 1L0
Inverness	MACMILLAN, Peter	RR #1 Whycocomagh	B0E 3M0
Kings	FRANK, Eric W. MILLETT, Don	P.O. Box 100 Kentville	B4N 3W3
Lunenburg	PELLEY, Sarah	RR #1 LaHave	B0R 1C0
Pictou	POST' Adrian	RR #2 New Glasgow	B2H 5C5
Richmond	O'HEARN, John	RR #1 D'Escousse	B0E 1A0
Shelburne	STEWART, Dudley	Box 71, Shelburne	B0T 1B0
Victoria	NICHOLSON, Edmund	RR #1 Baddeck	B0E 1B0
Yarmouth Co.	WHITTAKER, Trent	RR #5, Yarmouth	B5A 4A9
Yarmouth Town	JESS, Charles	403 Main St., Yarmouth	B5A 1G3

During 1990 the following inspectors retired; Herb Coombs (Colchester), Malcolm Rice (Annapolis), Vernon Sweeney (Yarmouth) and Brian McCormack (Pictou). Significant administrative changes were made in Colchester with the appointment of Tom Van Oirschott as a full-time inspector and with the appointment of Sarah Pelley as the first weed inspector for Lunenburg County.

13.0.2 Velvetleaf

Velvetleaf has been designated as a noxious weed in Nova Scotia since 1968. It is a native of Asia that has spread into central Canada from the adjacent United States. It was introduced to the southern United States over 100 years ago as a potential crop. Research has shown that velvetleaf is relatively slow to become established in an area; however, once establishment occurs the species is almost impossible to eradicate. Velvetleaf is very competitive with most crops, resulting in major reductions in yield at low densities of infestation. It tolerates most of the herbicides used in crop production in this province. Establishment of velvetleaf on our crop land would necessitate the use of additional and new herbicides by farmers to maintain current levels of production.

Velvetleaf has occurred sporadically throughout the province for several years and has been eradicated whenever and wherever found. However, in 1990 a massive increase in the occurrence and density of the noxious weed velvetleaf was observed. Of 172 farms in Colchester County that were surveyed, one or more velvetleaf plants were found on 43, an occurrence rate of 25 percent. Several farms had 10 or more plants and one farm had 200. Similiar statistics, in proportion with the concentration of farming, were reported for other municipalities. A major publicity campaign was initiated to alert the public to be on the look-out for velvetleaf and to destroy any plants found. Burning of all plant parts was recommended. Velvetleaf plants were invariably found growing on manure piles and in fields that had received applications of manure. This pattern of distribution indicates that velvetleaf may be entering the province with imported feed grains. Weed Science Services is currently investigating this route of introduction and the potential for removing velvetleaf from feed grain stocks or obtaining feed from areas where velvetleaf is not a problem.

During 1991 we shall attempt to restrict further intoduction of viable velvetleaf seed into the province and shall continue an intense surveillance and control program.

13.6.3 Noxious Weed Control on Public Right-of-Ways

Research clearly indicates that public roads and railroad right-of-ways are the major routes of noxious weed invasion. Noxious weed control on these properties is the responsibility of the property owner. Weed inspectors monitor these properties and advise property owners concerning required controls. During 1990 major control programs were continued, utilising herbicides, mowing and pulling to control noxious weeds wherever they occurred on right-of-ways.

Chapter 14

PLANT PATHOLOGY

Rick Delbridge, Plant Pathologist

14.1 OVERVIEW

Very dry, warm conditions from June - September, dramatically reduced many horticultural crop diseases. However, this led to drought conditions and reduced yields in a number of crops, notably, peas, potatoes, carrots, cole crops, processing beans and lowbush blueberries. Winter damage reduced yields in highbush blueberries, raspberries and strawberries. Notable diseases or diseases reported for the first time in the Province included raspberry yellow rust, dill leaf and petiole blight, *Alternaria and Phytophthora blight* of ginseng, tomato crown and root rot, geranium rust, bacterial soft rot of poinsettia, russian olive canker and bacterial ring rot of potato. During the year an IPM program was initiated in six commercial strawberry plantings, a red stele detection service was conducted on strawberry nursery stock, a potato late blight forecast was conducted, a vegetable seed treatment service was provided and a Monilinia blight survey and monitoring service was provided for lowbush blueberry growers. Plant Pathology Extension duties were conducted throughout the year on horticultural crops.

14.2 BERRY CROPS

14.2.1 Strawberry

Verticillium wilt, *Verticillium dahliae*, was found in three locations in 1990. In two of the fields the recently released Kentville cultivar, Cavendish, was severely infected. Previously, this cultivar was thought to have a high degree of resistance to wilt. Red stele, *Phytophthora fragariae*, can be found throughout the Province in commercial plantings. Growers now have three resistant cultivars that can be planted in sites prone to red stele. There are four known races (strains) of the fungus in Nova Scotia, designated NS-1, 2, 3 and 4. NS-2 is the most common while NS-1 has been found in only two fields and NS-3 and NS-4 have been found in only one field each. The three red stele resistant cultivars are resistant to three of the four known strains occurring in the Province.

Winter damage was reported in some locations, particularly in the Chester area where entire fields were lost. Cool, wet conditions during the second and third weeks of May delayed blossoming and picking by about one week. However, conditions in June were just about ideal for blossoming and fruit development. Dry conditions during blossoming prevented Botrytis outbreaks and reduced fruit rot at harvest. Leaf spot and leaf scorch were of minor importance. The warm conditions did favor powdery mildew *Sphaerotheca macularis* especially after renovation. It became clear that sulfur barely gave adequate control.

Above average temperatures and damp conditions in October and November caused extensive *Botrytis* decay of petioles, stolons and in some cases crowns of strawberry plants prior to freeze-up. These infections

could have an effect on the overwintering ability of affected plants.

A great many diseases or disorders were diagnosed during the season, including, herbicide damage, fertilizer burn, leaf blotch, angular leaf spot, green petal, Botrytis storage mold, slime mold and multiplier disease.

Extension Activities & Programs

Meetings: I attended the Strawberry Growers Annual Meetings held in Coldbrook and participated in the IPM report to the growers. I also attended three Strawberry IPM Organizational Meetings.

Strawberry Nursery Certification Program

Five regular nursery inspections were conducted in 1990. Powdery mildew was the most troublesome disease due to the lack of effective fungicides and the susceptibility of some cultivars. The southern cultivars, Selva and Pajora are especially susceptible to the disease.

Red Stele Detection in Nursery Stock

The red stele detection procedure has become a very important part of the Nova Scotia certification scheme. Root tips from the nursery stock are collected in November and December and mixed with "clean" potting soil. The very susceptible Baron Solemacher variety is planted in this mixture. The plants are grown in the greenhouse at 18°C for 6 - 7 weeks and examined for red stele symptoms. This is an extremely sensitive test. No red stele was found in any of the stock tested in 1989 - 1990.

Strawberry IPM Program

An Integrated Pest Management Program was funded by the Canada/Nova Scotia Agri-Food Development Agreement with Lorne Crozier and Rick Delbridge as project leaders. Six growers took part in the project during the 1990 growing season. See the Berry Crop/Entomology for the complete project report.

General Extension

Consultation services were provided to growers. Thirty-four farm calls were made to growers during the 1990 season. Contributions were made on a timely basis to the strawberry newsletter. Three fact sheets were revised and one new one was released.

14.2.2 Lowbush Blueberry

Monilinia blight, *Monilinia vaccinii - corymbosi* was not a significant factor in 1990. In fact, disease levels were the lowest in years. Although mean temperatures were favorable for disease development, dry conditions in early May prevented many infections from taking place. The first mature apothecia were found on May 3 and first blight symptoms on June 1. At Kentville only one rain induced infection period occurred between April 22 — May 13, an extremely unusual occurrence. The bloom period was also dry and this limited losses from Botrytis blossom blight.

A number of growers reported defoliation resulting from Septoria leaf spot and powdery mildew but this occurred too late in the season to affect yields appreciably. Anthracnose, *Colletotrichum sp.*, was diagnosed in the Pigeon Hill area.

Mummy Nurseries *(Monilinia Blight)*

Fruit infected with Monilinia (Mummies) were placed in fields in blueberry producing areas in the fall of 1989. These locations were staked and the development of the resulting apothecia was monitored throughout

the spring of 1990. The nurseries provided an excellent way to time fungicide applications for fields in the vicinity of the nurseries.

Meeting & Extension

I attended the Annual Meeting of the Blueberry Producers and presented a disease talk to Oxford Frozen Foods blueberry employees. In addition, Disease & Insect Field Meetings were held in early June. These field meetings were held at Collingwood, Nappan, Parrsboro, Debert, Dean, Gore, Blue Mt. and Lochaber. Ninety-three growers participated.

Seventy-nine field visits were made during the growing season. One fact sheet was revised and the new fact sheet "Timing of Fungicide Applications for Monilinia Blight" was released. Contributions were made to the Blueberry Newsletter.

14.2.3 Raspberry

Most growers reported poorer yields in 1990 due to winter damage. Yields in some plantings were off as much as 50%. As with strawberry diseases, raspberry diseases were not serious problems. Yellow rust, *Phragmidium rubi-idaei*, reported for the first time in Nova Scotia in 1989, was once again prevalent in the same planting in 1990. The disease was monitored during the season. A serious root rot disease found in other areas of the Northeast has not been found in Nova Scotia. Attempts to isolate the organism from several sites were made during the spring period.

Some of the more important diseases diagnosed in 1990 were: crown gall, spur blight, powdery mildew, anthracnose, late yellow rust and orange rust (blackberry).

Extension activity on this crop involved grower visits, consultations, nursery inspections, attending and speaking to the Raspberry Growers Annual Meeting and disease diagnostic work.

14.2.4 Grapes

Crown gall and powdery mildew are the major disease problems facing grape growers. Powdery mildew was not a problem this year due to control measures used by growers. Botrytis bunch rot was a slight problem for some producers at harvest time. During the year I spoke to two grower meetings on disease concerns and their control and made contributions to the Grape Newsletter.

14.2.5 Highbush Blueberries

Winter injury caused low yields in this crop once again. Cold winter temperatures apparently damaged the fruit buds. Diseases diagnosed during the season included anthracnose, Godronia canker, Monilinia blight and powdery mildew. Extension activities included grower visits, consultations and a disease presentation to the Highbush Blueberry Growers Annual Meeting.

14.3 GREENHOUSE & PROTECTED CROPS

Fusarium crown and root rot of tomato was found for the second year in one greenhouse operation. The disease destroyed 10% of the plants. The disease was found in one other operation in 1990. This can be a very devastating disease, however, a new resistant cultivar (Trend) shows promise. Pith necrosis of tomato was isolated from two greenhouses in the Province. Root knot nematode caused very heavy losses to a cucumber crop resulting in poor vigor, low yields and early removal of the crop. Other diseases of note included Pythium root rot in both tomatoes and cucumbers, especially in NFT production. Tomato scab, Cladosporium fulvum, caused severe defoliation on a spring tomato crop until it was brought under control. Botrytis or gray mold continues to be a big problem especially in plastic and poorly ventilated crops. Cercosporiduim punctum was found causing a severe blight of leaves and petioles of dill. This is a

new report for Nova Scotia. Poor ventilation and improper heating contributed to the severity of the disease. Alternaria blight and Phytophthora root rot were found in a large planting of ginseng. Phytophthora root rot can be a limiting factor for this crop.

Tomato spotted wilt virus testing was once again offered to Nova Scotia commercial growers using the Agdia Elisa Test Kit. Plant species found to be infected were cyclamen, gloxinia, cineraria, exacum and begonia. Sixty-three tests were conducted. Other greenhouse ornamental diseases encountered were Pythium root rot of exacum, Fusarium crown rot of exacum, Colletotrichum on azalea, Cylindrocarpon root rot of rose and Cylindrocladium blight of azalea and Geranium rust, *Puccinia pelargonii - zonalis*, was found in two locations in the Province. This is a new report for this disease in Nova Scotia. A problem developed in young seedlings growing in a peat starter mix. Six growers had the problem. Plants were stunted and the foliage chlorotic and bleached. The problem was tentatively diagnosed as ammonia release from the nitrogen source used in the peat mix. Pythium root rot was a common problem in a number of poinsettia houses. *Pseudomonas cichorii* was isolated from poinsettia. It caused a soft rot of the petiole This was also a new report.

During the year I gave disease lectures to the Bedding Plant Short Course and the Poinsettia Day held in Kentville. In addition to diagnostic work done for the greenhouse industry, contributions were made to the greenhouse newsletter and grower visits were made as necessary.

14.4 HOME GARDEN & ORNAMENTALS

A great many disease inquiries are received via telephone, letters, office visitations or referrals from other department staff. Some interesting diseases diagnosed included Verticillium wilt of smoke tree (a new report), Pythium root rot of dahlia, Phomopsis canker of russian olive, Colletotrichum on azalea and rhododendron and potato stem nematode on dahlia tubers (a new report).

14.5 VEGETABLES

Potato late blight was not found in the Province in 1990. This is very unusual. It has been found each year for at least the last 20 years. This indicates that weather conditions certainly were not favorable for the development of most vegetable diseases. During the months of June – September at Kentville only 197 mm precipitation fell compared to the 30 year verage of 324 mm. Mean temperatures were also up, especially in June, July and August. This led to severe drought conditions in many areas of the Province. Potatoes, peas, carrots and cole crops suffered the most. Potato scab was a problem for a few early tablestock producers but cleared up as the season progressed and skin set improved. Bacterial ring rot was once again found in several tablestock fields.

As required by the regulations to the Potato Industry Act, persons wishing to import seed potatoes from outside Canada must first obtain permission to do so, in order to ensure the potatoes are not infected with bacterial ring rot. Growers wishing to import seed from outside Canada made application to the Nova Scotia Department of Agriculture & Marketing. Applications were carefully checked to ensure that the seed conformed to Canada Seed Standards. In addition, the loads were inspected upon arrival, samples taken and tested for bacterial ring rot. Two diagnostic tests were conducted: immunofluorescence and latex agglutination. All samples proved to be negative. A total of 58,200 cwt were imported into the Province primarily from the state of Maine.

The warm weather appeared to be conducive to some diseases. Black rot caused extensive damage in two Brussels sprout cultivars. The sprout seed undoubtably carried the bacterium. Carrot blight, both Alternaria and Cercospora were very prevalent in processing fields in northern Nova Scotia. Bacterial blight was common in field beans but economic losses did not occur. Dry soil conditions reduced Sclerotinia problems in processing beans. Itersonilia canker caused losses of 45 — 50% in parsnips from a field where proper rotations were not conducted. Broccoli head rot was a minor problem due to dry conditions in August.

Extension Activities & Programs

Meetings: I attended the Vegetable & Potato Growers of N. S. Annual Meeting as well as two Carrot Meetings and a Potato Seminar where I gave disease presentations.

Hot Water Seed Treatment Service

Cole crop seed was treated for commercial growers. This treatment eliminates seed borne disease infections.

Potato Late Blight Forecasts

Potato late blight forecasts were issued twice a week from June 26 - September 17, 1990 for a total of 25 forecasts. Spray recommendations were determined from humidity and temperature data collected from a hygrothermograph that was placed in an experimental potato plot at Sheffield Mills, Kings County. Forecasts were carried on the Vegetable Market Line.

General Extension

Consultation services was provided to growers. Farm calls were made on a request basis and regular contributions were made to the vegetable newsletter. Diagnostic services were provided for identification of vegetable pathogens and disorders.

14.6 COMMITTEES

14.6.1 Expert Committee on Pesticide Use in Agriculture (ECPUA)

I attended committee meetings held in Ottawa, December 3 and 4, 1990 as the Representative for the Atlantic Region. The Committee changed its name to the Expert Committee on Pest Management, Insects/Diseases. Reports were given on Pest Management concerns in the Atlantic Region. The 1991 meeting will be held in Vancouver, B.C.

14.6.2 Atlantic Crops Committees (ACC)

I attended the ACC Meetings held in Memramcook, N. B. November 7 and 8, 1990. I am a member of the Vegetable Committee, the Berry Crops Committee, the Pest Management Committee and I sit in on the Greenhouse-Ornamental Committee as well and the Potato Committee.

Chapter 15

ENTOMOLOGY — BERRY CROPS AND VEGETABLES

By Lorne M. Crozier, Entomologist

15.1 OVERVIEW

Participation in the blueberry insect survey increased to 42 growers and 297 fields. Insect populations were generally lower in 1990 and no severe damage resulted from insect activity. The blueberry leaftier populations was reduced by cool weather conditions in May.

A new set of regulations for interprovincial movement of lowbush blueberries with regard to blueberry maggot were implemented.

A strawberry pest monitoring program was implemented on six farms in Colchester and Pictou Counties. Two-spotted spider mite was the major pest in strawberries, especially in nursery plantings.

Cranberry and highbush blueberry pests were monitored. Infestation levels were very low.

In the vegetable sector, diamondback moth was one of the major insects which caused problems. Brussels' sprouts producers were especially plagued by this insect. Corn earworm and cabbage loopers were more prevalent during the latter part of August. Onion thrips levels were high during July and affected several crops including onions, leaks and cabbage.

A total of 302 specimens were received for identification. Household pests and ornamental pests were the most commonly received samples.

Activities and participation in short courses, field demonstrations and meetings are also outlined.

15.2 LOWBUSH BLUEBERRY INSECTS

The annual sweepnet survey was carried out this year. The number of growers who participated was 42 and the number of fields surveyed was 297. Both of these are increases over the previous years. Michelle Ralph, a second year student at the Nova Scotia Agricultural College was hired to pick up and sort the samples.

The overall number of fields with insect infestations(27) was down from the previous year(42). Case beetle populations were not as prevalent as in the previous year. Blueberry leaf beetle infestations were somewhat higher, as were the number of blueberry sawfly infestations.

A separate survey for blueberry leaftier was conducted in the Diligent River area. A total of 18 fields were sampled by collecting blueberry shoots and examining the fruit buds for leaftier damage. Levels of infestation were drastically reduced in 1990, probably due to cool weather conditions during May. One field in the Fenwick area of Cumberland County had a moderate outbreak of leaftier. This is the first outbreak

of this insect outside of the Diligent River-Parrsboro area. A detailed report of both of these surveys is available in the Plant Industry Project Reports.

Blueberry fruitfly continues to be a concern for blueberry processors. A greater effort is being made by many growers to control this insect. Traps for monitoring the adult flies are made available to growers, free of charge, by the Blueberry Producers' Association of Nova Scotia.

The Plant Health Directorate revised regulations controlling movement of blueberries and blueberry plant material within Canada. The principal changes are listed below.

1. Removal of the prohibitions of fresh fruit and used containers into British Columbia and Newfoundland.
2. A mandatory grading requirement for fresh fruit packed in containers of six litres or less.
3. Treatment of containers to certify freedom from blueberry maggot.
4. Sealing of trucks carrying empty used containers from an infested to a non-infested province.

A summary of the regulations is given in the accompanying table.

15.3 STRAWBERRY INSECT PESTS

The Strawberry Growers' Association of Nova Scotia initiated a strawberry pest and disease monitoring program; with Rick Delbridge and myself as project leaders. Funding was obtained through AFDA.

This is a four-year project, aimed at reducing the number of pesticide applications used by growers. This project was implemented very hastily and without adequate time for proper preparation. This and other factors resulted in less than satisfactory results during the first season. It is hoped that this situation will improve during the next year of operation. A detailed report of this project is included in the Plant Industry Branch Project Report.

The major strawberry pest in 1990 was the two-spotted spider mite. This was especially true in several of the nursery plantings. Hot dry weather in July and August contributed to this problem. There also seemed to be resistance to Kelthane in some of the mite populations. There is a need to develop a better control program for two-spotted spider mite.

Strawberry weevil damage was a problem in several fields throughout the province.

One grower experienced considerable damage to his field by strawberry root weevil.

I participated as a member of the strawberry nursery inspection team. All nursery plantings are inspected five times per season for any disease or insect problems.

15.4 CRANBERRY INSECTS

Pheromone traps were set out in a cranberry bog operated by Mr. Glen Hebb, Hebbville. The insects which were monitored were cranberry girdler and blackheaded fireworm. Neither insect was found in significant numbers to justify control measures. Berry samples were also taken to check for cranberry fruitworm. One application of insecticide was recommended to control this insect.

The owners of Bezanson and Chase Cranberries, Aylesford, were approached to have their bog monitored but they indicated that they were not interested.

15.5 HIGHBUSH BLUEBERRIES

One grower experienced a problem with winter moth feeding in one block of his planting. Light to moderate damage occurred.

Pherocon AM sticky traps were set out in four blocks at Blueberry Acres, Sheffield Mills, to monitor blueberry fruit fly. These were checked one a week throughout the growing season.

No fleas were detected in any of the traps.

15.6 VEGETABLE INSECT PESTS

In order to survey insect pest populations in the major vegetable growing regions of the province, a number of fields were monitored on a regular basis, using various insect traps. Four monitoring stations were located in Kings County, two n Annapolis County and one in Colchester County.

Pheromone traps for diamondback moth, cabbage looper, European corn border and corn earworm were set out at appropriate locations. Sticky traps for detecting cabbage maggot and carrot rust fly were also used. These traps were checked on a weekly basis throughout the growing season. Those in Truro were checked on a daily basis. In addition, a blacklight trap was operated in Truro, in cooperation with Dr. Harold Specht, Agriculture Canada, Kentville. A corn earworm trap and pheromone caps were supplied to a grower in the Bras D'Or area of Cape Breton.

A sweepnet survey of carrot fields in Colchester County was conducted to determine six spotted leafhopper levels. This project was carried out by my summer assistant.

In addition to my regular monitoring, I made two trips to Cape Breton to visit growers in that area.

I also participated in a project with Dr. Phil Warman, NSAC, to provide insect monitoring for his vegetable project.

15.7 COLE CROP INSECTS

Cabbage maggot was present in its usual numbers. Most growers had little problem keeping it under control.

Imported cabbageworm numbers were very low. Winter survival was apparently very poor. Significant numbers of this insect did not appear until September.

Cabbage looper caused some damage in August and September. This insect is very sporadic in its distribution.

Diamondback moth populations were very high throughout most of the summer. They continued to be active until the end of October. The most severe damage caused by this insect was to Brussels' Sprouts. One grower in Annapolis County had severe damage to his crop. One field was rejected for processing by Cobi Foods. This damage occurred in spite of up to twelve insecticide applications. Preliminary results from tests performed by Agriculture Canada indicate that the larvae were resistant to both Monitor(Methamidophos) and Ambush(Permethrin).

One grower reported a problem with onion thrips attacking cabbage.

Tarnished plant bug was reported damaging cauliflower.

15.8 SWEET CORN INSECTS

European cornborer populations were light to moderate. Corn earworm flights were heavy in mid August and in late September.

Fall armyworm numbers were very low.

15.9 POTATO INSECTS

Colorado potato beetles were numerous this year. One commercial field had high numbers of adults present when the potatoes were just beginning to sprout. There did not seem to be any problem in controlling these insects.

15.10 OTHER VEGETABLE INSECTS

Aster leafhopper was abundant in carrot fields in Colchester County. Cabbage looper and serpentine leafminer were found in one field of celery. Garden webworm was found in lettuce and cabbage fields in Cape Breton. A small amount of root aphid damage to lettuce was reported. Onion thrips levels were high in leaks and onions.

15.11 ORNAMENTAL INSECT PESTS

I investigated an outbreak of armyworms on a sod farm at Amherst.

A morning was spent with Edmunds Brothers, Halifax, checking damage to yews and other ornamental plantings. Most of this turned out to be winter damage or damage from salt spray. I also investigated a sod webworm problem in several lawns in Dartmouth with The Weedman.

In general, chinch bug populations were quite numerous in several regions of the province. Hot dry weather conditions were a primary factor in allowing chinch bug numbers to build up.

Red humped caterpillars and other general leaf feeders were also abundant on trees this summer. I also participated in an information booth at the Garden and Patio Show in Halifax and at a flower show in Sydney.

15.12 INSECT IDENTIFICATION

A total of 302 specimens were received for identification. Household pests accounted for 102 or 34% of specimens received. These included larder beetles, merchant grain beetles, booklice and other stored food product pests.

Sixty-four specimens (21%) were non-economic insects. These included several giant water bugs, Polyphemus and Cecropia moth caterpillars, and other similar oddities.

Insect pests of ornamentals comprised 16% or a total of 49 specimens. These have been discussed in a previous section.

I received 33 specimens from the Department of Health and Fitness. A number of these were ticks. Considerable interest has been shown in ticks as one species is responsible for the spread of Lyme disease. I have been able to provide an identification service to the Department of Health and Fitness. Any dubious specimens are forwarded to the Biosystematics Research Centre in Ottawa.

Only one specimen of *Ixodes dammini*, the deer tick, was received. This tick is capable of carrying Lyme disease. The specimen was sent in by a doctor in Collingwood.

Other ticks received included six groundhog ticks, *Ixodes cookei*; three rodent ticks, *Ixodes muris*; two American dog ticks, *Dermacetor variabilis*; one brown dog tick, *Rhipicephalus sanguineus*; and one specimen of *Ixodes marzi*.

A total of thirteen samples were sent in by veterinarians. Some of these were included in the list of ticks submitted above.

Sixteen specimens of home garden pests were identified. This number is substantially lower than in the previous year when over 30 specimens from home gardens were received.

Twenty-five or 8% of the specimens were from commercial operations. These included growers from a number of sectors, including greenhouse, vegetable, berry crops, cereals as well as some from non-agricultural industries.

15.13 OTHER EXTENSION ACTIVITIES

I took part in several short courses including lowbush blueberry, organic vegetable production and ornamentals.

I gave two lectures at the NSAC - one to the Entomology seminar course and one to the Agricultural Meteorology course.

I gave a talk on insect orders to three grade four classes at the F. MacDonald School in Pictou County.

A presentation on pesticide safety was given at Skye Glen, Inverness County.

Reports were presented at the Strawberry Growers Association annual meeting and the Blueberry Producers Association annual meeting. Two lowbush blueberry information sessions and seven field demonstrations were participated in.

I gave a presentation at a meeting for carrot growers in Colchester County.

The Vegetable and Potato Producers Association annual meeting, the BPANS summer tour and a tour for carrot growers in Colchester County were attended.

In out-of-province activities, I took part in the Atlantic Committee on Crops meetings at Memramcook, New Brunswick. At these meetings I participated in three advisory committees including pest management, berry crops and vegetable production.

I attended the North American Lowbush Blueberry Workers and Researchers Conference in Moncton, the Acadian Entomological Society meetings in Fredericton and a meeting to discuss research priorities for blueberry fruit fly, held in Fredericton.

I worked on a committee to prepare a pesticide safety display for use at various exhibitions and functions.

I judged the honey exhibits at the Atlantic Winter Fair and also participated in the Agricultural Awareness display.

IMPORT AND DOMESTIC REQUIREMENTS FOR HOSTS OF BLUEBERRY MAGGOT

ORIGIN: Infested area
DESTINATION: Non-infested area

COMMODITY	REQUIREMENT	
	IMPORT	DOMESTIC
Rooted Plants	° Permit and phytosanitary certificate and ° Kept free from flowers and 1 ° Grown indoors in proper media or 2 ° Plants washed free of soil or 3 ° Soil treated and plants shaken free of soil	° Domestic movement certificate and ° Kept free from flowers and ° Grown indoors in proper media or ° Plants washed free of soil
Fresh Fruit	1 ° Packed in containers of 6 l or less and ° Graded US N° 1 and ° Grade certificate or	° Packed in containers of 6 l or less and ° Graded Canada N° 1 and ° Inspection certificate or
	2 ° Packed in containers of more than 6 l and ° Destined to a processing plant and ° Special import permit or	° Packed in containers of more than 6 l and ° Destined to a processing plant which has agreed in writing to meet special conditions and ° Domestic movement certificate or
	3 ° Packed in containers of more than 6 l and ° Certified free from blueberry maggot based on sampling and inspection and ° A phytosanitary certificate or	° Packed in containers of more than 6 l and ° Certified free from blueberry maggot based on sampling and inspection and ° Domestic movement certificate
	4 ° Packed in containers of more than 6 l and ° Fumigated and ° A phytosanitary certificate	
Used Containers	° Treatment certificate and 1 ° Wash and hot water or 2 ° Wash and fumigate	° Domestic movement certificate and ° Wash and hot water
Farm Machinery	° A certificate (e.g. USDA form 540) and ° Washed free of soil and debris	° Domestic movement certificate and ° Washed free of soil and debris
Trucks carrying empty containers		° Sealed at origin and seal removed at destination by Agriculture Canada

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Chapter 16

APICULTURE

By Dick Rogers, Apiculturist/Entomologist

16.1 OVERVIEW

The beekeeping industry in Nova Scotia has remained optimistic even though parasitic mites are spreading with disasterous consequences all over North America. In fact, NS beekeepers are exhibiting an outstanding degree of energy and support for the battle against mites and in the process are grasping opportunities to expand and diversify the industry. At present, and to the best of my knowledge, NS beekeepers and the NS government have been more proactive and successful in these matters than most other provinces in Canada and this has, at least temporarily, provided stability and opportunity.

Fruit growing in Nova Scotia has benefited tremendously over the years from integrated pest management (IPM) research, and implementation efforts of extension and private sector programs. The challenges of insect and mite mangement however are ever changing. Therefore, renewed and improved programs are required just to keep up with the occurrence of new pests, changing attitudes, market demands and reduced efficacy of current control products. Very dynamic programs for educating growers about IPM principles and practices are desperately required to avoid regression in management of orchard pests.

16.2 STATISTICS

Table 16.1: Nova Scotia beekeeping statistics, 1990

	1990(1)	10 YR. AVG.
Est. total no. beekeepers	380	562
No. registered beekeepers	327	—
No. colonies	6200	6108
Avg. no. col/beekeeper	16.3	11.3
Honey yield/col (kg)	35.0	32.2
Total honey production (kg x 1000)	217.0	195.1
Value of honey crop ($ x 1000)	651.0	—
Value of industry (honey, wax, pollen, pollination services x $1000)	884.0	-(2)
No. col. wintered 90/91	6000	5140(3)
No. apiaries in prov.	800	706(4)

(1) Subject to revision
(2) 2 yr avg
(3) 3 yr avg
(4) Est. in 1989

Figure #.1. Number of beekeepers in Nova Scotia, 1966-1990.

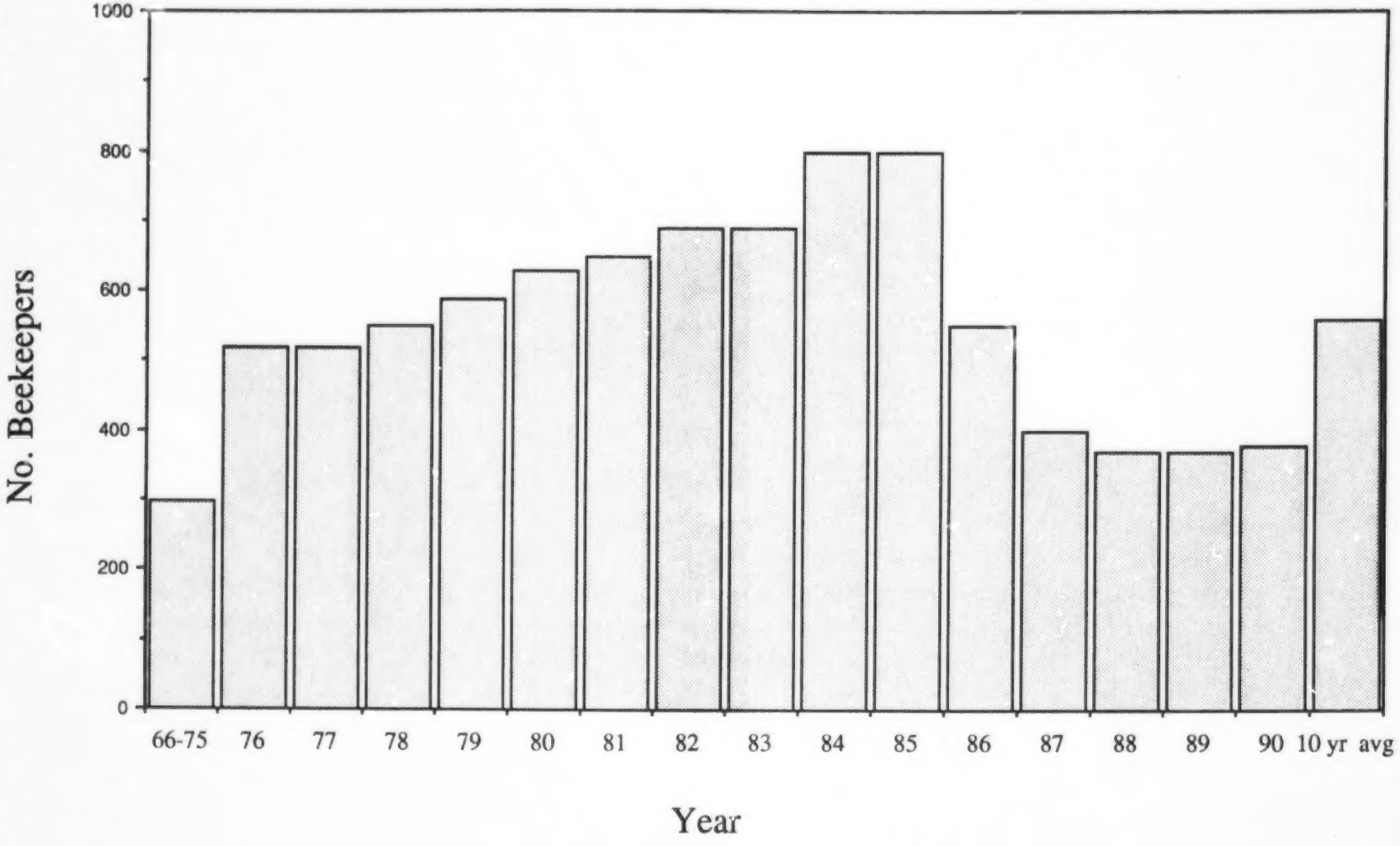

Figure #.2. Number of honey bee colonies in Nova Scotia, 1966-1990.

Figure 16.2:

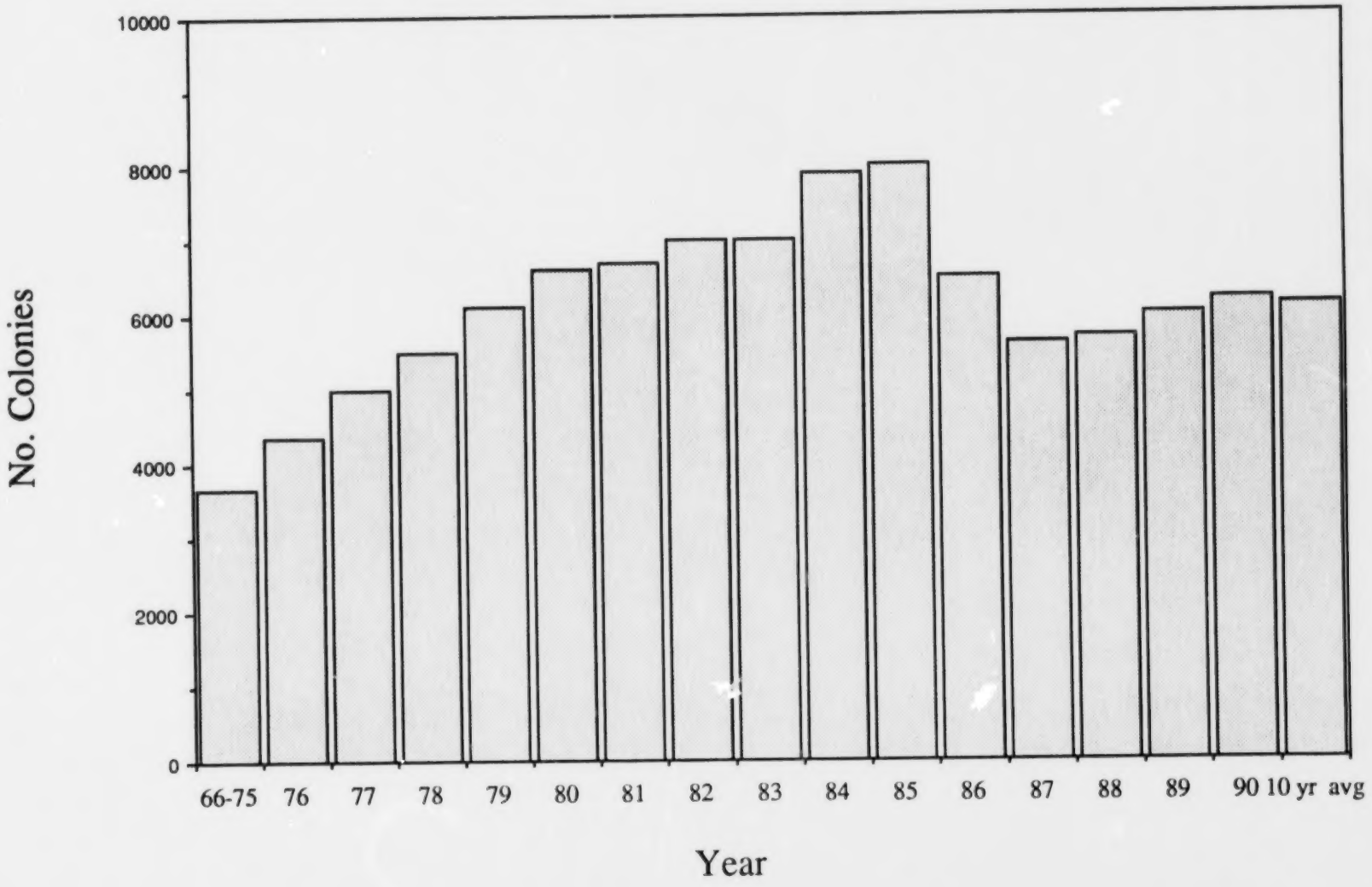

Figure #.3. Percent of colonies in each county of Nova Scotia, 1990.

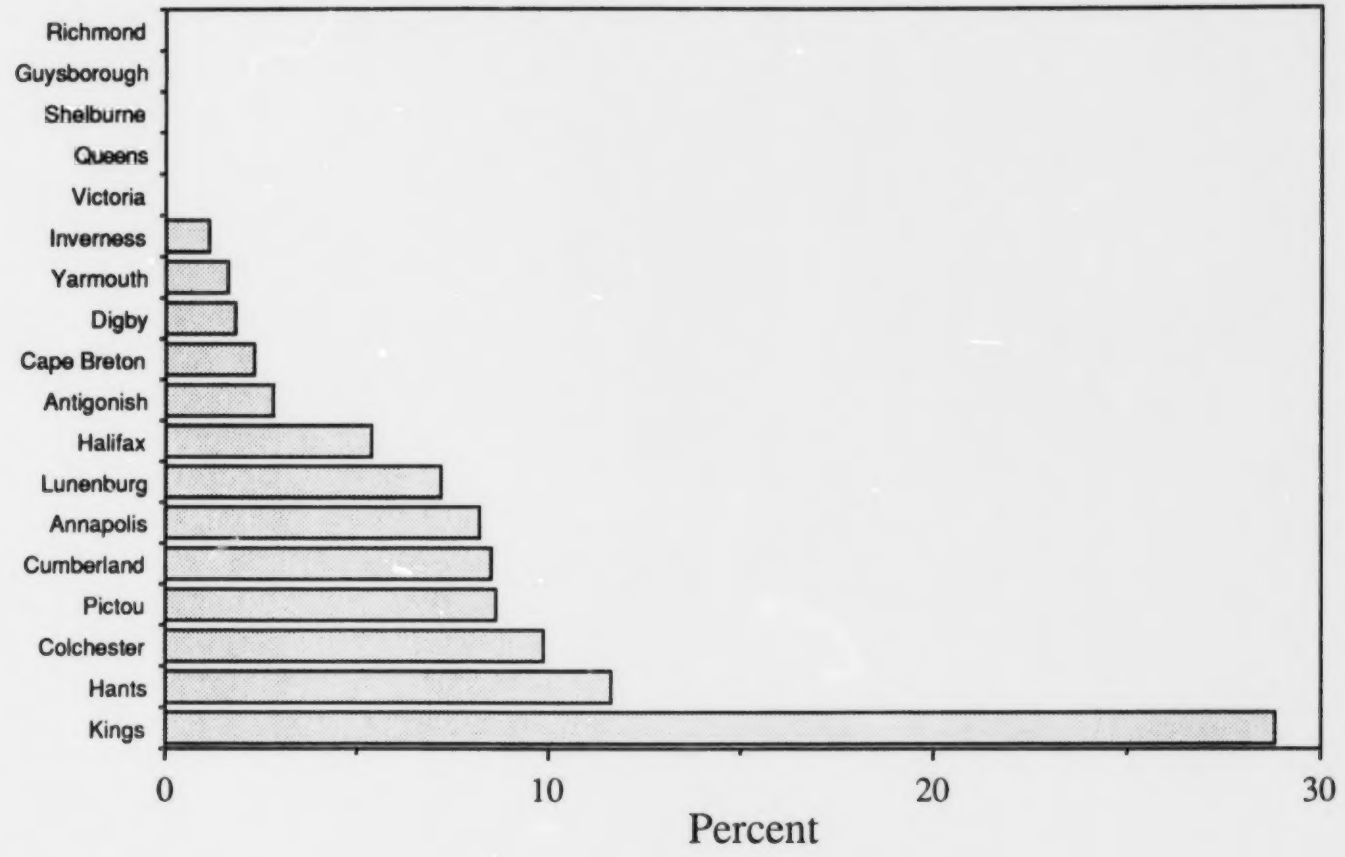

Figure 16.3:

County

16.3 IMPORTATIONS OF BEE STOCK AND USED EQUIPMENT

Table 16.2: The number of package bees, nucleus hives, and queens imported to Nova Scotia, 1984-1990

	84	85	86	87	88	89	90
1 kg. pkg. (or equiv.)	1704	1006	476	964	676	225	1421(1)
nucleus hives	u/k	u/k	u/k	u/k	27	0	0
queens	1929	2014	1963	2273	1336	1406	1601(2)

(1) Source: New Zealand; 1142 of these were 100% subsidized by the NSDA&M as an emergency importation to help meet the demand for pollination of blueberries.

(2) Source: 871 Australia, 730 New Zealand

One box car load of used hive bodies, with frames and drawn comb, was brought in by train from Saskatchewan in June. Several NS beekeepers were involved in the purchase.

Other equipment was brought in from New Brunswick, mainly by NB beekeepers who now have permanent apiaries in Nova Scotia. Permits were issued to allow this movement to take place. The NS Dept. of Highways weigh station in Amherst was asked to watch for movement of beekeeping equipment and to check for permits. Cooperation from the NS Dept. of Highways on this point was very good at the administrative level, but poor at the implementation level. In almost every case, weigh station staff claimed to be unaware of the request and only reluctantly dated and signed the permits. I expect that further diplomacy will be required to achieve the desired level of cooperation.

16.4 LOCAL PRODUCTION OF BEE STOCK

Table 16.3: The number of nucleus hives and queens produced in Nova Scotia, 1986–1990.

	'86	'87	'88	'89(1)	'90
Nucleus hives	400	400	450	450	500
Queens	400	0	0	77	450(2)

(1) Queen rearing project started (AFDA project #TIP-51)
(2) 250 produced by project TIP-51 directly; balance produced by beekeepers
(2) who received training, information, and/or motivation from the project.

16.5 APIARY INSPECTION

Beekeepers were made aware of new legislation that would affect them by announcements in the Beekeeping Notes newsletter. The final versions of the new Act and Regulations were developed in open consultation with the NSBA and therefore the announcements were well received. Table 16.4 provides a summary of the apiary inspection program results.

Table 16.4: Apiary inspection program results, 1986-1990

	86	87	88	89	90
No. inspectors/assistants	2	2	2	2	2
No. col. inspected	1378	1257	383	639	140
INCIDENCE OF DISEASE (% of hives inspected)					
American foul brood	6.5	1.8	1.3	3.0	6.4
European foul brood	6.0	8.8	3.4	8.0	10.7
Chalkbrood	28.4	27.2	24.3	32.0	31.4
Sacbrood	12.0	9.9	5.2	5.0	5.7
PARASITIC MITES					
No. apiaries sampled for honey bee tracheal mite (HBTM)(1)	52	29	0	165	165
Incidence of HBTM (% of apiaries sampled)	0	0	0	0	0.6(2)
No. apiaries sampled for Varroa mite (VM)	0	0	131	165	168
Incidence of VM (% of apiaries sampled)	0	0	0	0	0

1. Revised figures

2. Sample not analysed until 1991, therefore please refer to the next annual report for more details.

Chapter 17

PROVINCIAL LABORATORY SERVICES SECTION

By Ben Harnish, Supervisor

17.1 OVERVIEW

Some major changes occurred in the Analytical Services Section during 1990. Major renovations were completed to the old student laboratory on the third floor to house the pesticide residue laboratory which moved from Kentville on 1 September. In addition, one of our non-chemical storage rooms was totally renovated to house the soil physical analysis operation. These renovations caused some disruptions during the course of the summer but we certainly welcome the new facilities which will serve us for many years into the future.

We lost one staff member during 1990, with the retirement, after 37 years service, of Ian Swan. We also welcomed one new staff member in the person of Milo Barbour.

Statistical summaries of samples received during 1990 appear in Table 17.1 through Table 17.9.

17.1.1 Soil Chemistry

Soil samples declined in 1990 compared to 1989 but were consistent with the previous 3 to 5 year average. Soils, in 1989, had reached an all time high. Greenhouse soils declined in 1990, primarily due to a significant decline in samples from the Nova Scotia Dept. of Lands and Forests. Samples from the agricultural sector remained fairly stable.

17.1.2 Soil Physics

Samples requiring soil physical analyses declined sharply during 1990. Because of lab renovations, the Soils Section reduced the number of samples taken through the LEAPS program to an absolute minimum. This is reflected in the fact that only 38% of analyses were conducted in support of LEAPS compared to 70% in 1989.

An additional 38% of analyses were conducted as a result of contract work, 20% for Plant Industry staff and 4% for others.

17.1.3 Livestock Feed

Livestock feed samples increased for the 7th straight year, with most of the increase being attributed to forages. Receipt of forage samples has almost doubled in the past 5 years.

Foliar tissue samples from the agricultural sector have shown a gradual decline over the past five years.

On the other hand, water samples have shown a gradual increase. The most significant increase in 1990 was in domestic samples, with an increase of 45%.

17.1.4 Pesticide Residue

Samples were down sharply in this category, partly because of the renovation and move involving this lab. Also, 1989 was the initial year of the Kings County Well Water Survey and accounted for approximately three times as many water samples as in 1990.

Table 17.1: 5 Year Laboratory Sample Summary

MATERIAL	1986	1987	1988	1989	1990	% CHANGE
Soils						
Field	12,331	13,096	11,996	14,656	12,368	
Greenhouse	2,734	2,938	1,951	1,494	914	
Total	15,065	16,034	13,947	16,150	13,282	-17.8%
FEED						
Forage	4,386	5,968	6,529	7,508	8,213	
Cereal	1,085	1,596	675	887	879	
Milled Feed	2,047	1,881	2,056	1,621	1,401	
Other	925	1,039	1,054	986	1,073	
Total	8,443	10,484	10,314	11,002	11,566	+5.1%
TISSUE						
Commercial	2,343	2,850	2,491	2,370	2,372	
Research	1,614	1,045	555	853	323	
Total	3,957	3,895	3,046	3,223	2,695	-16.4%
WATER	2,298	3,199	2,783	3,363	3,600	+7.0%
MISC.	175	951	321	251	281	
TOTAL	29,938	34,563	30,273	33,989	31,424	-7.5%

Table 17.2: 5 Year Feed Sample Summary

MATERIAL	1986	1987	1988	1989	1990
Forage					
Hay	1,398	1,237	1,563	2,302	2,355
Haylage	1,283	1,695	2,452	2,662	3,502
Forage	1,699	3,036	2,514	2,544	2,356
Total	4,386	5,968	6,529	7,508	8,213
Cereal	1,085	1,596	675	887	879
Milled Feed	2,047	1,881	2,056	1,621	1,401
Other					
Canada Packers	707	597	741	735	835
Mink & Fox	173	396	273	158	86
Misc.	45	46	40	93	152
Total	925	1,039	1,054	986	1,073
Total	8,443	10,484	10,314	11,002	11,556

Table 17.3: Feed Research Projects

MATERIAL	1986	1987	1988	1989	1990
Forage					
Soils & Crops	565	311	578	907	982
Plant Science	523	505	73	254	295
Animal Science	50	0	99	26	20
Other	0	878	30	0	0
Total	1,138	1,694	780	1,187	1,297
Grain					
Soils & Crops	661	426	400	528	608
Other	—	631	—	—	—
Total	1,799	2,751	1,180	1,769	1905

N.B. Feed research samples are included in totals in 5 year summary

Table 17.4: Plant Tissue Sample Summary

MATERIAL	1986	1987	1988	1989	1990
Greenhouse Tissue	1,909	1,858	1,620	1,563	1324
Hydroponic Sol'n	246	232	214	155	154
Animal Tissue	188	185	190	98	250
Seaweed Extract	–	575	467	466	608
Research Samples	1,614	1,045	555	941	359
Total	3,957	3,895	3,046	3,223	2695

Table 17.5: Tissue Research Projects

SOURCE	1986	1987	1988	1989	1990
Animal Science (NSAC)	915	681	—	0	0
Chem.-Soils (NSAC)	299	276	441	727	186
Plant Science (NSAC)	103	0	0	0	0
Other	297	88	114	214	173
Total	1,614	1,045	555	941	359

Table 17.6: Water Sample Summary

	1986	1987	1988	1989	1990
N.S. Dept. of Tran.	1,039	1,805	1,107	1,093	1341
N.S. Dept. of Envir.		28	52	87	26
N.S. Dept. of Health		14	40	71	25
Agricultural Supplies		235	261	513	123
Municipal		48	64	26	12
Industrial			209	248	149
Domestic	1,259	1,069	1,050	1,325	1,924
Total	2,298	3,199	2,783	3,363	3,600

Table 17.7: Greenhouse Soil Summary

SOURCE	1986	1987	1988	1989	1990
N.S. Dept. Lands & Forests	1,558	1,992	851	604	143
Agricultural Services	1,176	946	1,100	890	771
Total	2,734	2,938	1,951	1,494	914

Table 17.8: Soil Physics Lab

	1987	1988	1989	1990
Particle Size	523	834	765	238
pH	1,046	1,434	1,264	432
Bulk Density	224	661	529	399
Hydraulic Conductivity	224	412	146	39
Organic Carbon	152	251	239	174
Cation Exchange Capacity	28	85	49	23
Moisture Retention	161	341	231	26
Moisture		64	383	118
Total	2,358	4,122	3,606	1,449

Table 17.9: Pesticide Analysis

Samples Received January 1 To December 30, 1990

MATERIAL	NB	NS	PEI	NF	NS DEPTS	OTHER	TOTAL 1990	TOTAL 1989
Soil		7		4		1	12	38
Water		1			64	8	73	256
Plant Material		10		3		8	21	43
Milk	10						10	15
Vomitoxin		14	2				16	26
Other		3				2	5	13
TOTAL (1990)	10	35	2	7	64	19	137	
Total 1989	29	57	3	18	237	47		391